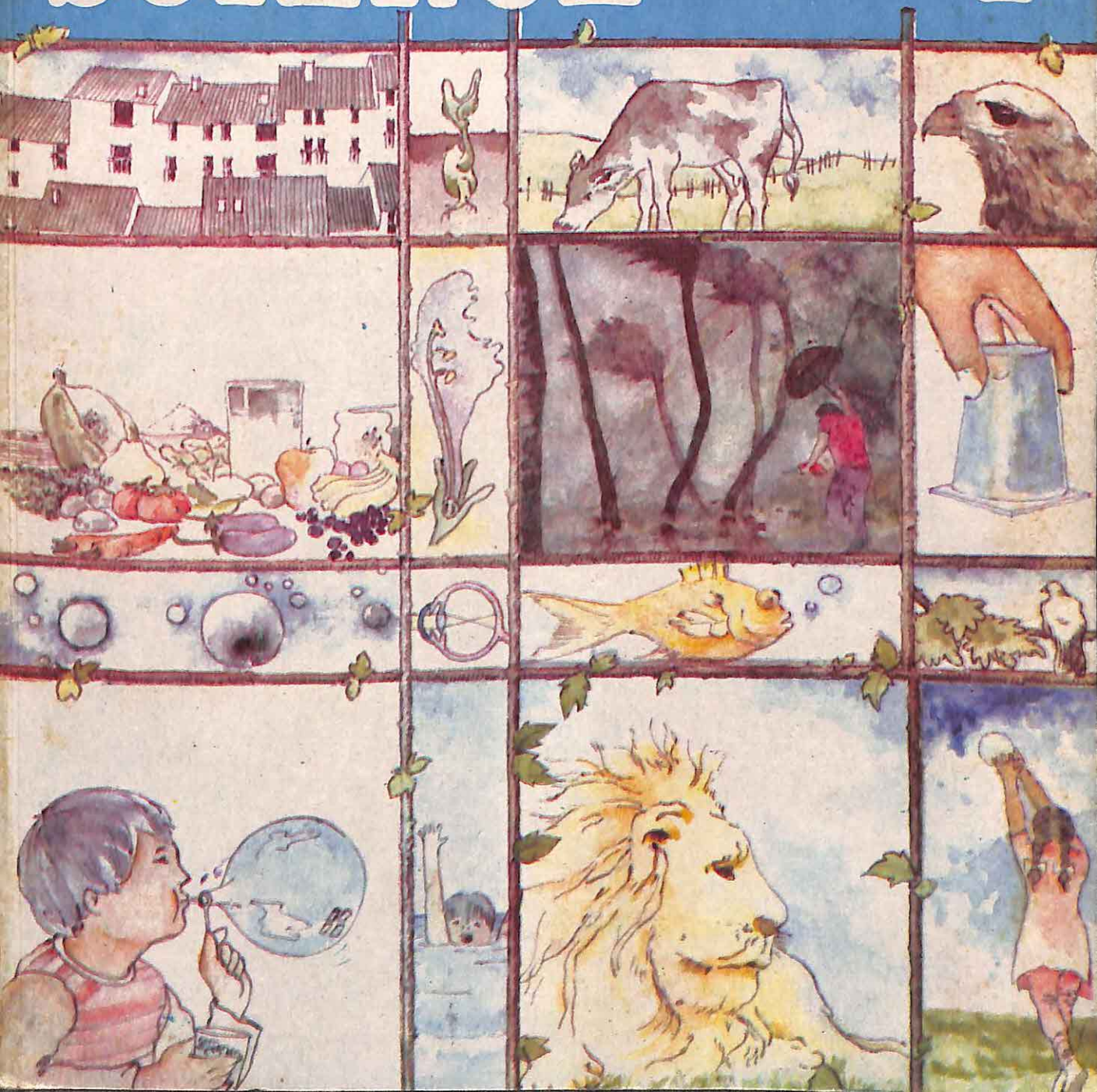


# DISCOVERING SCIENCE 4





# DISCOVERING SCIENCE

## BOOK 4

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**Sangam Books**



## NOTE TO THE TEACHER

In the course of writing these books, some decisions have been taken with the recognition that this is a course for the primary level. The terminology and vocabulary must therefore be exact without emotionally distancing the young learner.

The teacher's attention is also drawn to the fact that for some plants, fruits and vegetables, the *most* familiar names have been used since there are regional variations. It seemed appropriate, for instance to say *lady's fingers* and *brinjal* instead of *okra* or *aubergine*. Wherever necessary, the teacher is advised to substitute words that are better understood for such words. However, it is also recommended that 'internationally' understood words are introduced at the appropriate level so that they pass into the learner's passive vocabulary.

ACC No - 15598

© 1983 Sangam Books (India) Pvt. Ltd.

ISBN 0 86131 413 1

First Published 1983

Eleventh Impression 1991

Published by Sangam Books (India) Pvt. Ltd.

3-5-820, Hyderguda, Hyderabad 500 029 (A.P.) India

Phototypeset by Dynamic Photosetters

106, Tana Street, Purasawalkam, Madras 600 007

Printed by Jayshree Printers

22, Weston Street, Calcutta 700 013

Distributed by Orient Longman Ltd.

17 Chittaranjan Avenue, Calcutta 700 072



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## PREFACE

*Discovering Science* offers a new and challenging set of texts which has grown out of modern approaches to learning and teaching science. The five books in the primary series are based chiefly on the syllabus and recommendations of the National Council of Educational Research and Training (NCERT). The books also take into account the syllabuses of other primary-school systems.

The series presents science as the logical, exact discipline it is. The concepts of interdependence and of cause-effect in natural phenomena are clearly established. In the text, as in the exercises, science emerges as knowledge bound up closely with everyday life. A sense of ecology is also developed in a simple manner.

The texts are profusely illustrated, and are planned with a view to stimulating the child's interest and curiosity. The exercises should serve not only to recapitulate what has been learnt, but to create lines for thinking, interpretation, deduction, classification — all of these appropriate to the age-level. Due account has been taken of the possibilities and limitations of the classroom.

The authors and publishers are grateful to the many teachers consulted in the preparation of the books. They are likewise grateful to the artists who have designed and illustrated the books.

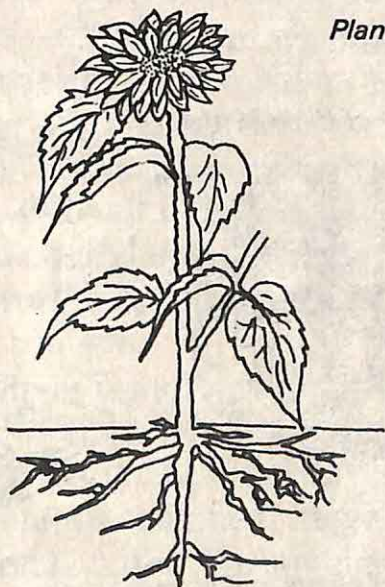


### 1. Life processes

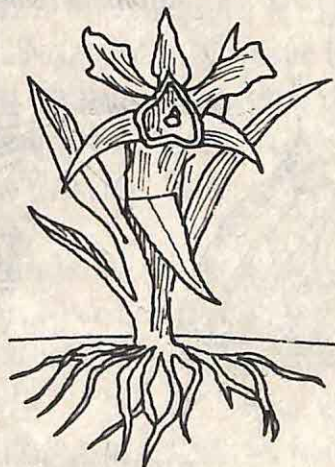
The world is full of living and non-living things. Examples of non-living things are books, chairs, water, salt, sand, clothes and air. Living things are plants and animals. Do you remember what you learnt about living and non-living things in Book 3?

#### A common plant

The sunflower plant has roots, stem, leaves and flowers. Other plants have either all or most of these parts also. But they do not look like the sunflower plant. Plants differ in size, shape and structure.



*Plants differ in size, shape and structure.*



#### A common animal

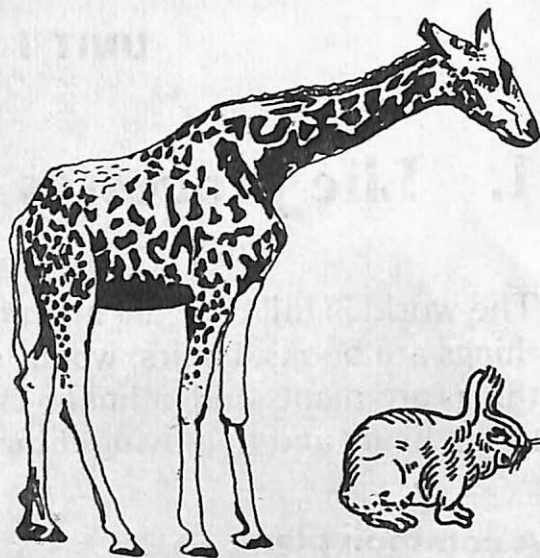
The rabbit has a head with eyes, mouth, nose, ears and a body which is supported by limbs. So do most other animals. But animals also differ in their size, shape and structure.



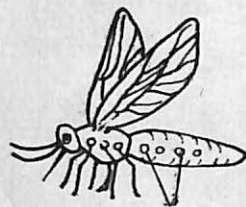
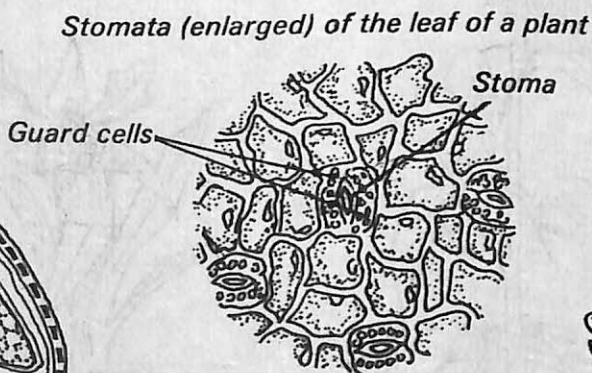
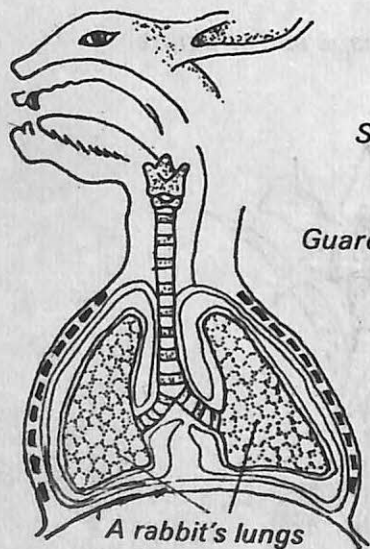
Living things are able to do certain things that non-living things cannot. These are called life processes.

### The various life processes

1. **Breathing:** Plants and animals breathe. Breathing involves taking in oxygen and giving out carbon dioxide in its place. Oxygen is found both in air and in water. Most land animals breathe with the help of lungs and fishes with the help of gills. Insects have breathing tubes called tracheae which open out to the exterior as paired spiracles or breathing pores. Plants have pores called stomata on the surface of their leaves through which they breathe.



*Animals also differ in size, shape and structure.*



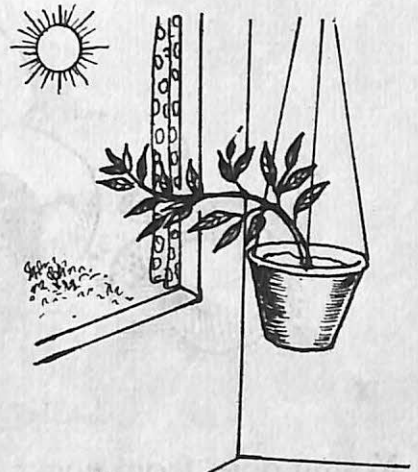
*Breathing systems of plants and animals*

2. **Feeding:** Green plants take in raw materials from air and soil and convert them into food. Animals feed upon dead and living plants and animals. Food gives energy to plants and animals to carry out the various life processes.



3. **Growth:** Because living things feed they increase in size. Kittens grow into cats. Small fish become big fish. Small plants grow into big trees.
4. **Feeling:** Plants and animals sense or feel things surrounding them. They also respond to these things. For example, on a hot day you feel the heat outside and respond by moving to the shade of a tree. Animals have sense organs like skin, eyes, ears, nose and tongue with which they sense things.

Plants also sense and respond to their surroundings. A plant inside a room, placed near a window through which sunlight enters, will grow towards it. This is because the plant senses the direction of light. Since it needs sunlight it responds by growing towards it. But the response in plants is very much slower than in animals.



*Plants need sunlight and will grow towards it.*

5. **Movement:** All living things move.

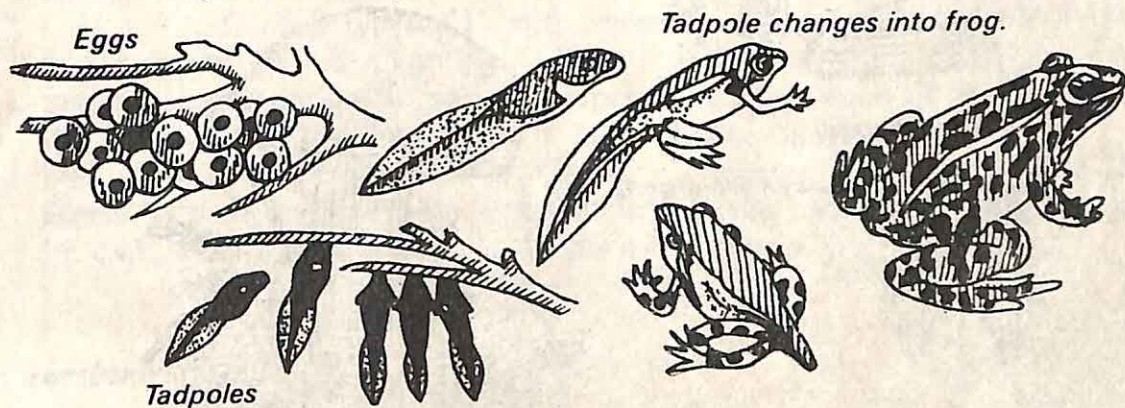
Plants do not need to move much as the materials needed for their growth like water, air and nutrients are within their reach. But this does not mean that plants do not move at all. Most plants move so slowly that it is very difficult to notice any rapid change. Movement in plants can be seen in the opening and closing of flowers. Roots move down in search of water and grow towards gravity. The stem moves towards sunlight.

Movement is more obvious in animals. Movement in animals depends on the type of food they eat. Some animals like the cheetah and the horse move very fast whereas others like the tortoise and the elephant move slowly.

6. **Removal of waste:** Carbon dioxide is a gas which is not needed by animals. They have organs like gills and lungs for removing carbon dioxide from their bodies. Apart from sending out waste in the form of gas, animals send out waste as dissolved salts in urine and as semi-solid faeces.



But after some time these young ones slowly change and grow to look exactly like their parents.



*The young one of a frog looks like a fish.*

2. Young ones born alive: The young ones of animals like sheep, cows and dogs grow within the body of their mother. After sometime their mothers give birth to these young ones which look exactly like their parents. These animals, which bear their young in their uterus and suckle them (give them milk) when they are born, are called mammals.

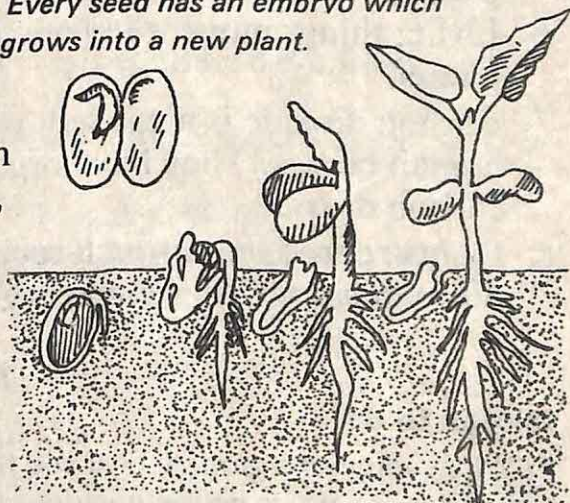


*Young ones born alive look like their parents.*

*Every seed has an embryo which grows into a new plant.*

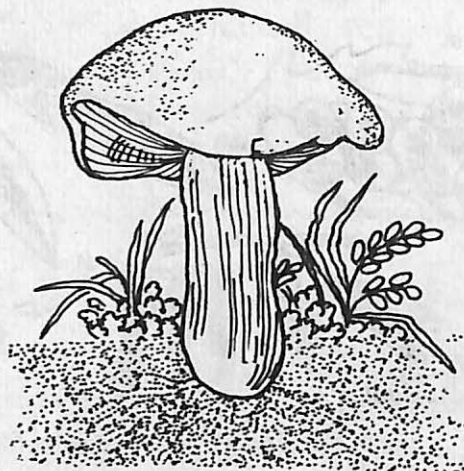
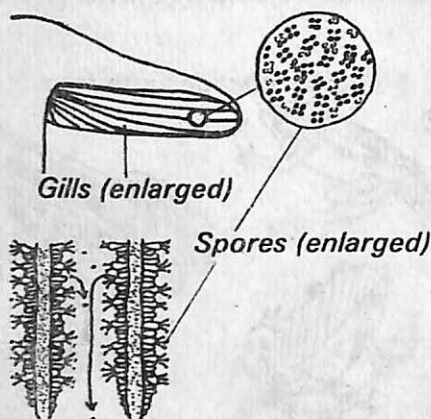
## **Reproduction in plants**

1. Young ones from seeds: Most flowering plants reproduce through seeds. Every seed has a baby plant, the embryo, inside it. If the seed is buried in suitable soil, after some time you will see a new plant coming out. The embryo grows into a new plant. The sunflower plant is an example of this.
2. Young ones from spores: Non-flowering plants, like moulds and mushrooms, grow from spores.





*Mushrooms grow from spores.*



### **Things to remember**

1. The life processes of living things are breathing, feeding, growth, feeling, movement, removal of wastes and reproduction.
2. Animals breathe through gills and lungs and insects through tracheae. Plants breathe through stomata.
3. Plants prepare their own food. Animals feed on plants and bodies of other animals.
4. Plants and animals grow.
5. Living things sense and respond to things around them. Response is much slower in plants than in animals.
6. Living things move. Movement is more obvious in animals than in plants.
7. Carbon dioxide is a gas sent out of the bodies of all animals and human beings. They have organs like gills and lungs for removing carbon dioxide.
8. Plants reproduce through seeds or spores. Some animals reproduce through eggs. Other animals give birth to live young ones.

### **Things to do**

1. When you visit a garden, or if you have a garden at home, note the similarities and dissimilarities between various flowering plants. Note that they have

common parts such as roots, shoot, leaves, flowers and even fruits. But the shapes and sizes of leaves and flowers differ. The various parts of the flowers also differ in their colours, shapes and sizes!

2. Collect five different types of flowers, spread them out well in order to expose all their parts, press them and paste them in your scrap book.
3. Prepare charts to show the various shapes, sizes and colours of leaves and flowers, for your class display board. Label them appropriately.
4. Note the various life processes of your or your friends' pet animals. Write a few sentences about each of them with sketches of your own. Make a tiny booklet for each animal. Display them in the display corner of your classroom.

### Exercises

1. Answer briefly:
  - a. List the various life processes.
  - b. How do plants breathe?
  - c. How do plants feed?
  - d. Which organs help animals to sense things around them?
  - e. Is movement more obvious in animals or in plants?
  - f. How is carbon dioxide removed from the bodies of living things?
  - g. What do the young ones of frogs and butterflies look like?
  - h. Do the young ones of dogs or cows look different from their parents?
  - i. How do flowering plants reproduce?
2. Answer in detail:
  - a. Describe how plants and animals breathe through different types of organs.
  - b. Describe how you feel your surroundings and respond to them. Give an example.
  - c. Write a few sentences about movement in plants.
  - d. In what way does reproduction in frogs and butterflies differ from reproduction in other animals?
  - e. Write a paragraph on how plants reproduce through seeds and spores.
3. Fill in the blanks:
  - a. Breathing involves taking in ..... and giving out .....
  - b. Food gives ..... to carry out the various life processes.
  - c. A plant near a window ..... the direction of light and ..... towards it.
  - d. Movement in plants can be seen in the ..... and ..... of flowers.
  - e. Every seed has an ..... inside it.
  - f. Eggs laid on land are kept warm by the ..... or by the heat of the .....



4. Tick the correct sentences. Correct the ones that are incorrect.
- a. Plants and animals are living things.
  - b. Oxygen is not found in water.
  - c. Plant response is much slower than animal response.
  - d. Plants do not move.
  - e. Young ones of birds and fishes look like their parents.
5. Find the odd one out in each group and give reasons for your choice.
- a. sunflower, bear, insect, car, margo
  - b. lungs, kidneys, gills, stomata
  - c. eyes, ears, tongue, eyebrows
  - d. butterflies, frogs, fishes, moths
6. Write down the type of reproduction for each, choosing from the following:  
eggs, born alive, seeds, spores.
- |                 |   |   |
|-----------------|---|---|
| a. fish         | ( | ) |
| b. turtle       | ( | ) |
| c. mould        | ( | ) |
| d. insect       | ( | ) |
| e. python       | ( | ) |
| f. balsam plant | ( | ) |
| g. rabbit       | ( | ) |
| h. sheep        | ( | ) |

### 2. Grasses useful to man and animals

Man has three basic needs — food, clothing and shelter. Plants are capable of supplying all these. Out of these food is the most important need. Plants supply food not only to man but to other animals also.



*Grasses are the prime source of food for man.*

You may be surprised to know that grasses are the prime source of food for man. Cereals and millets which form the staple food of man belong to the grass family. Millets are a special kind of cereal. Since cereals and millets grow in different climates and yield large amounts of food, they are cultivated as crops.

The edible portion of these plants is a seed or seedlike dry, tiny fruit commonly called a grain. Grains can be stored in large quantities for a long time.

Wheat and rice are two of the main types of cereals grown in our country. Millets like ragi and bajra are also kinds of grasses from which we get foodgrains.

The stalks of these plants are cut and dried to make hay and straw and are used as fodder for domestic animals. In fact, in some countries, cereals like oats and rye are grown mainly as fodder crops.





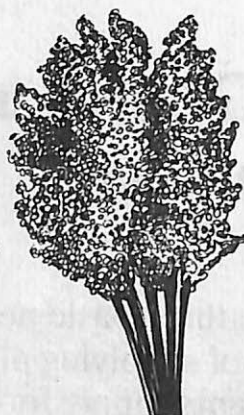
Rice



Wheat



Bajra

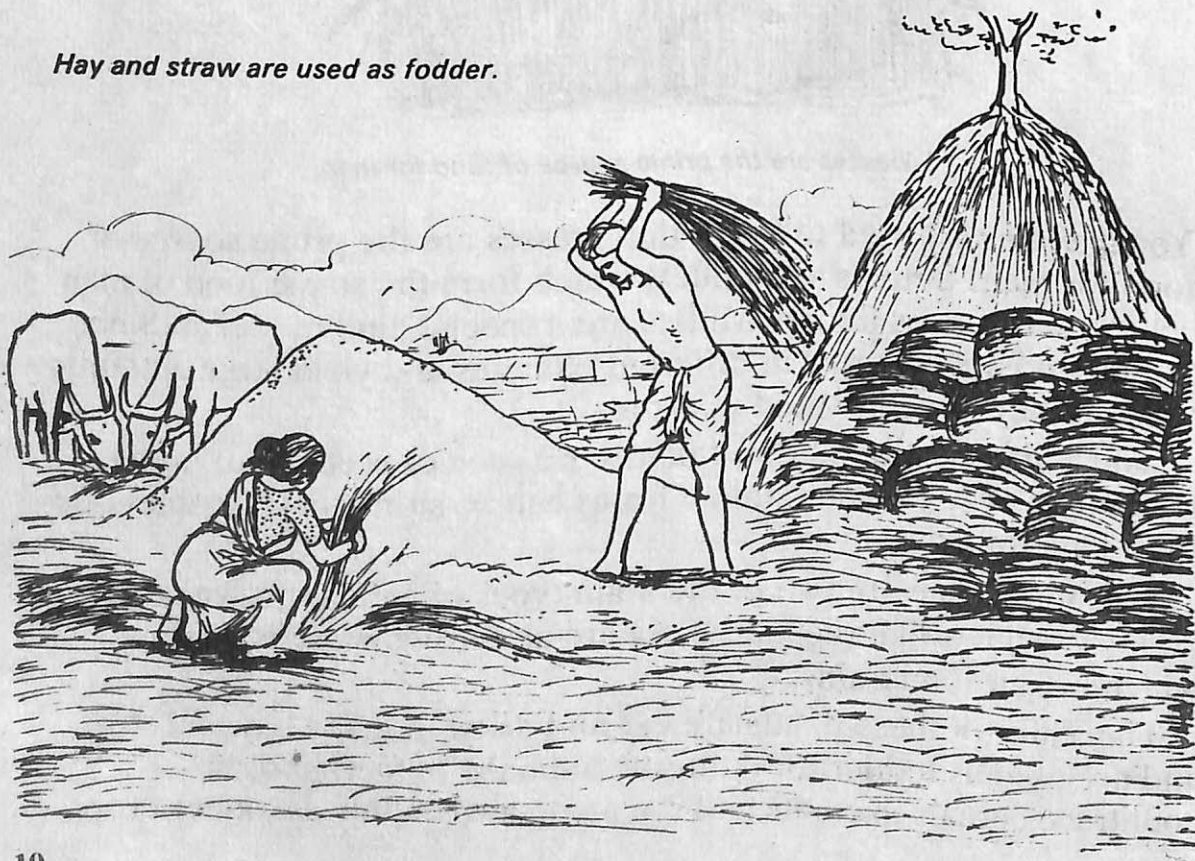


Sorghum

*Cereals and millets are cultivated as food crops.*

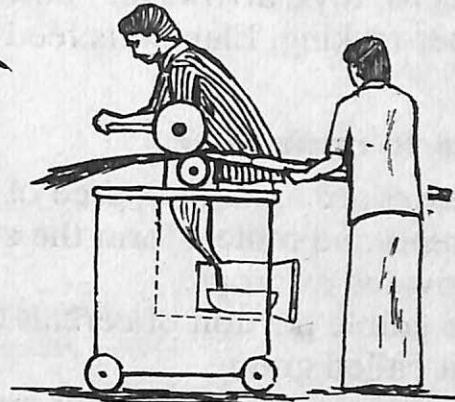
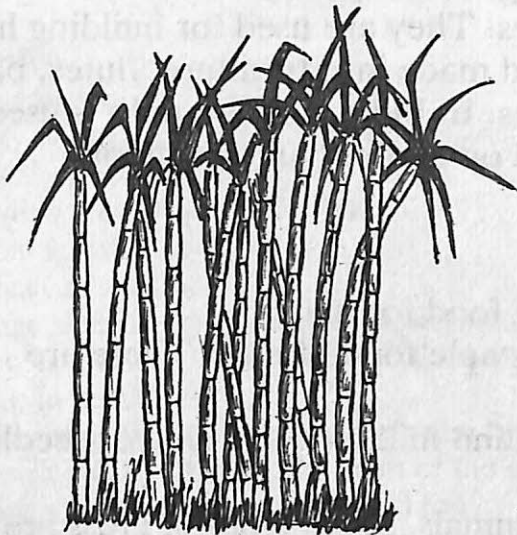
Not only cereals and millets but various other types of grasses are also used as fodder for animals.

*Hay and straw are used as fodder.*



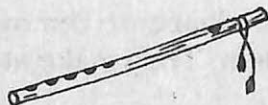
## Other useful grasses

*The stem of the sugarcane contains a juice rich in sugar.*



1. **Sugarcane:** This plant is also a type of grass. It is grown widely in India. The plant grows eight to twelve feet in height and has solid, bamboo-like stems. These stems or canes contain a juice rich in sugar. When ripe, the cane is cut and taken to factories. In the sugar factories the cane is crushed and the juice is taken out. With the help of machines the sugar is extracted from the juice and made pure.

*Bamboo stems have many uses.*



2. **Bamboo:** The bamboo also belongs to the grass family. These giant



grasses have long stems that are as tall as trees. But their stems are smooth, jointed and hollow inside. The branches are present at the top of the stem. The bamboo grows in plenty in our country. Bamboo stems have many uses. They are used for building houses and rafts. They can be cut and made into furniture, flutes, baskets, screens, toys, arrows and bows. In India bamboo pulp is used in paper-making. Elephants feed on tender bamboo shoots.

### **Things to remember**

1. Grasses are a major source of food for man.
2. Cereals and millets form the staple food of man. These are cultivated as crops.
3. The edible portion of cereals and millets is the seed or seedlike fruit called grain.
4. Grasses serve as fodder for animals. Some types of grass are cultivated as fodder crops.
5. The sugarcane plant belongs to the grass family. Sugar is got from this plant.
6. The bamboo, with which many useful things are made, is also a grass.

### **Things to do**

1. Visit farms and gardens. Look at the flower-stalks of each type of cereal or fodder grass. Notice the differences in their shapes, sizes, colours and structures. Draw their sketches for your class display board and label them suitably.
2. Pack various types of foodgrains in tiny polythene bags and display them on your class display board with suitable labels.
3. Cut broad bamboo poles at the nodes. Use sandpaper to remove the outer covering. Then paint your own designs on them. They make attractive vases and pen or pencil stands.
4. If sugarcane grows in nearby villages, you can go to see them during the flowering season. Collect the giant, feather-like flower clusters of sugarcane, dip them in various coloured solutions, dry them and decorate your classroom with them. You can arrange these feathery flowers in broad, painted and decorated bamboo-vases. You can also decorate your drawing-room with this flower-vase.



5. Buy small mats made of reed-grass and learn to paint on them. They will make attractive wall decorations!

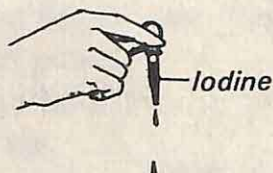
### Exercises

1. Answer briefly:
  - a. Why do we cultivate cereals and millets as crops?
  - b. Name two cereals.
  - c. Give two examples of millets.
  - d. What is straw or hay?
  - e. What are grains?
  - f. What is the average height of a sugarcane plant?
  - g. How is the stem of the bamboo different from that of the sugarcane?
2. Answer in detail:
  - a. Draw neat figures of two millets and two cereals.
  - b. How is sugar got from the stem of the sugarcane plant?
  - c. How is the bamboo plant useful to us?
3. Tick the correct sentences. Correct the ones that are incorrect.
  - a. Grasses can be grown only in certain regions.
  - b. Grasses provide food for man.
  - c. Wheat and rice are grown as fodder crops.
  - d. The cane of the sugarcane plant is the leaf of the plant.
  - e. The bamboo has a solid stem.
4. Name the useful parts of the following grasses (stem, leaves, seed):
  - a. sugarcane
  - b. bamboo
  - c. rice
  - d. fodder grass
  - e. ragi

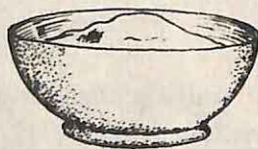


### 3. Uses of plants

1. Food: We have studied a little about how grasses serve to satisfy one of man's basic needs — food. Not only grasses but many other types of plants serve as a source of food for man and animals. This is because among living things plants alone are able to prepare their own food from certain simple raw materials. These raw materials are water present in the soil and carbon dioxide in the air. The excess food prepared is stored as starch in various parts of plants. The presence of starch can be easily shown by adding a drop of liquid iodine to any material containing starch such as potato, wheat or rice flour and cooked rice. Only starch can change to blue when it is touched with iodine. Add a drop of liquid iodine to the materials in the four groups of the figure. What happens?



*Starch turns blue when touched with iodine.*



*Rice flour*



*Wheat flour*



*Cooked rice*



*Potatoes*

The material turns blue.

You now know where the excess starch is stored in these plants.

We get not only carbohydrates (starch is a type of carbohydrate) but proteins, fats, minerals and vitamins from plants. Minerals and vitamins are obtained mainly from vegetables and fruits which may also be grown as crops. Thus every part of the plant — root, stem, leaf, fruit and seed — gives us food.

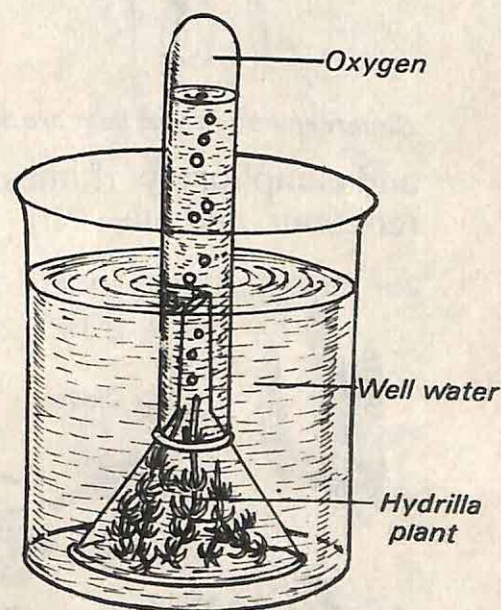


2. Green plants are air purifiers. They give out oxygen when they prepare starch. This can be shown by a simple experiment, called the hydrilla experiment, using the water plant hydrilla.

Place a hydrilla plant in a beaker containing either well water (which has a large amount of carbon dioxide dissolved in it) or tap water to which a pinch of baking soda is added. Carbon dioxide and water are necessary for the preparation of starch.

Cover the plant with an inverted funnel with a short stem so that the entire funnel is submerged in water. Invert a test tube, filled with the same water, over the stem of the funnel without allowing air bubbles to enter into it. Keep the apparatus in sunlight for a few hours. You can observe bubbles of gas rising from the cut end of the hydrilla.

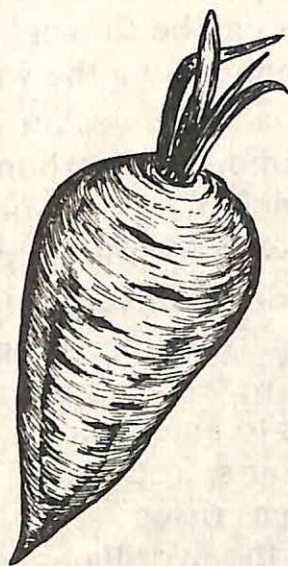
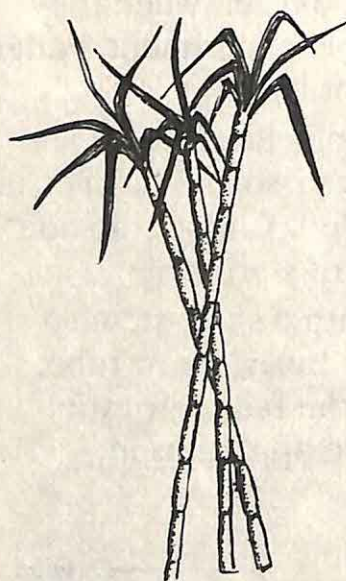
The gas collects in the test tube, displacing water. After a considerable quantity of gas has collected in the test tube, remove it carefully, closing it with your thumb to prevent the gas from escaping. Introduce a glowing stick into the test tube. The stick burns brightly. The gas in the test tube, which helps the stick to burn, is oxygen. This experiment proves that, when green plants prepare starch, they give out oxygen to the atmosphere and purify it.



*The hydrilla experiment*

3. Sugar producing plants: Sugarcane is the main source of sugar in our country. Jaggery is obtained from certain palm trees. Sugarbeet, grown in western countries, is also a source of sugar.
4. Oils: Different types of oil are obtained from seeds of plants. These are used differently. Oils may be used in cooking (coconut, sunflower, groundnut); in making medicines (eucalyptus, clove

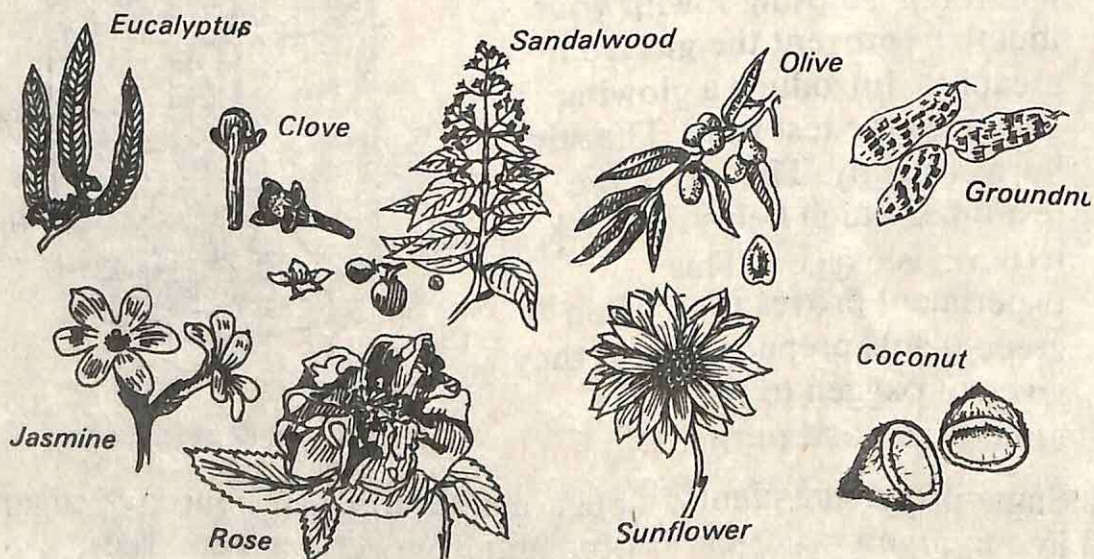




Jaggery is obtained from certain palms.

Sugarcane and sugarbeet are sources of sugar.

and camphor); perfumes (rose, jasmine, sandalwood); soaps (coconut and olive oil).

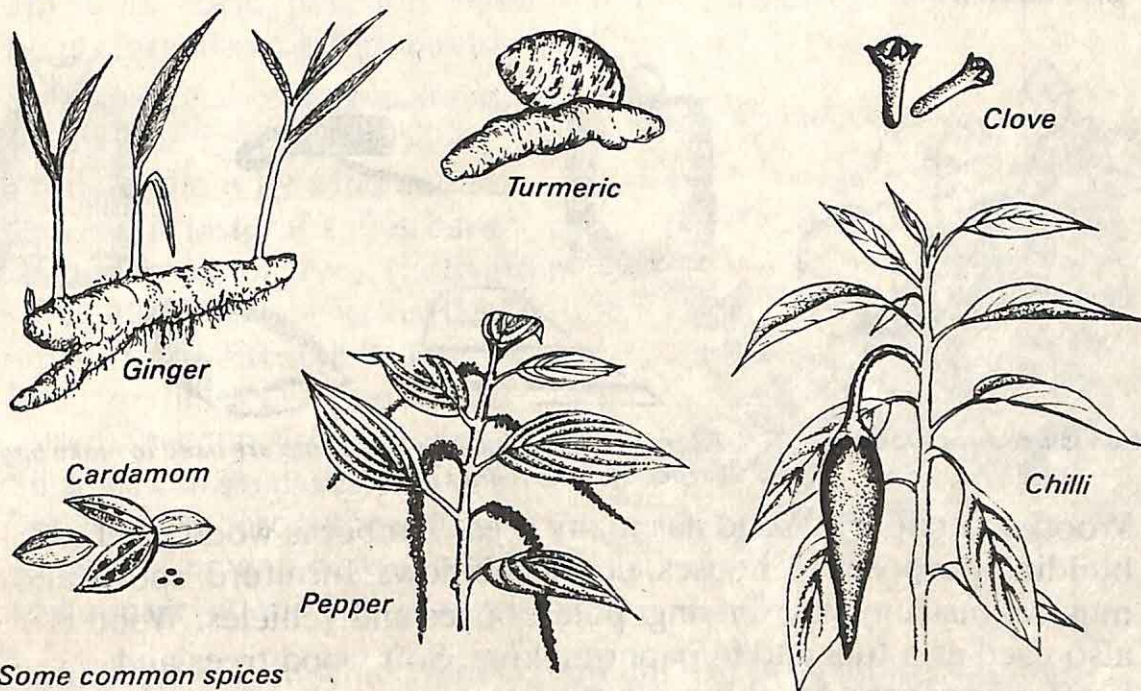


Oils are obtained from seeds of plants.

Other common uses of oil seeds are in making animal feed (oil cake), fertilisers, varnish and paints (turpentine).

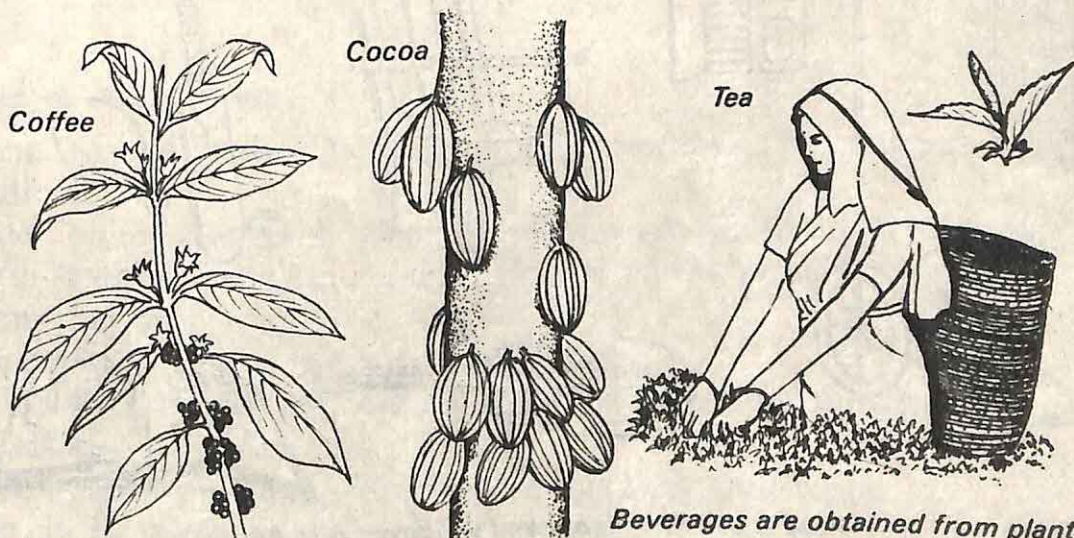


5. Spices: Spices give flavour to food. Some common spices are ginger, turmeric, cloves, pepper, chillies and cardamom.



*Some common spices*

6. Beverages: Beverages are also obtained from plants. Examples of such beverages are coffee, tea, cocoa and fruit drinks.



*Beverages are obtained from plants.*

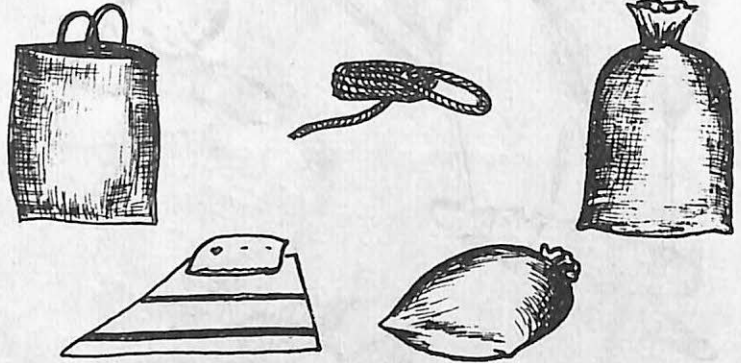
7. Fibres: Fibres fulfil another of man's basic needs — clothing. Cotton fibre is widely used in clothing. Other fibres like jute, flax,



coir and hemp are used in making bags, carpets, ropes, twines and sacks.

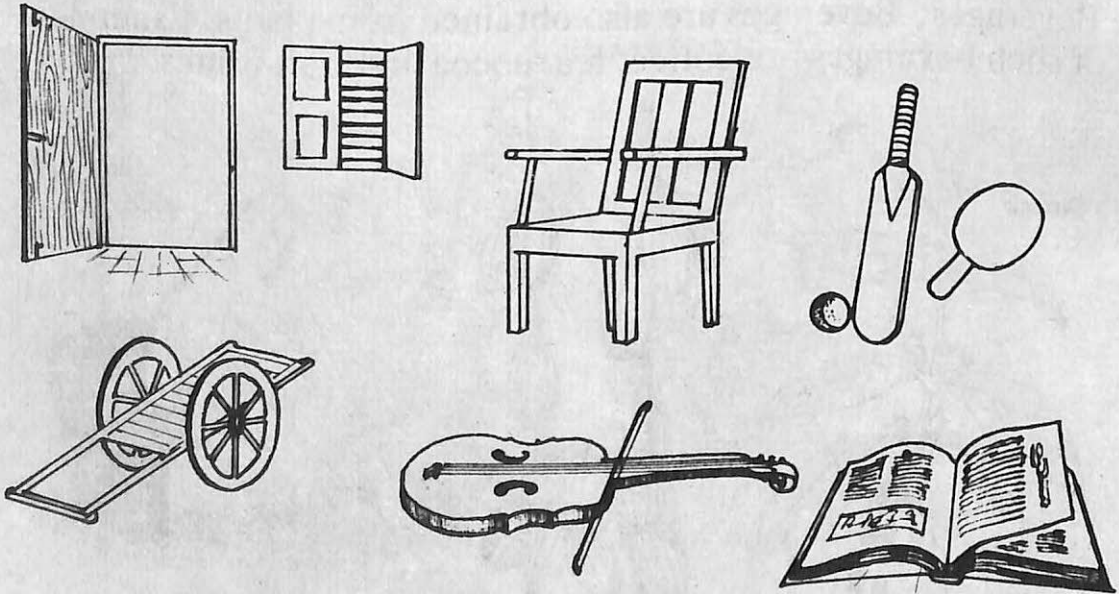


*Cotton is used for clothing.*



*Fibres like jute, flax, coir and hemp are used to make bags, carpets, ropes, twines and sacks.*

8. **Wood and paper:** Wood has many uses. Timber is wood used for building purposes — houses, doors, windows, furniture, sports and musical instruments, fencing, poles, boxes and vehicles. Wood is also used as a fuel and in paper-making. Soft wood trees and bamboo are used for this purpose.



*Wood is used for doors and windows, furniture, vehicles, sports and musical instruments and for paper-making.*

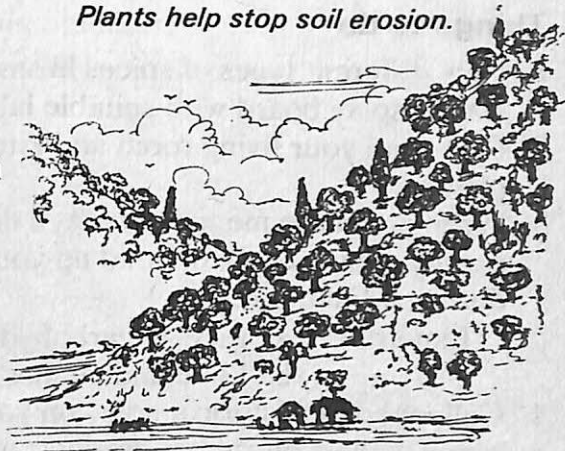
9. **Medicine:** Different drugs are obtained from various parts of plants. These drugs help cure many diseases and keep the body

strong and healthy. Some important plants used in medicine are cinchona, eucalyptus and cassia. Bacteria, which are very tiny plants, are also used in making medicines.

10. Soil making and its conservation:

Erosion or wearing of soil is brought about by wind and rain. Erosion is faster if soil is bare without grass or trees. Cultivation of plants helps stop or reduce soil erosion. Erosion is more likely on hillsides. Trees can be raised on steep slopes. Fields on hillsides can be ploughed horizontally across the slope, instead of up and down, to help soil conservation. This is called contour farming.

*Plants help stop soil erosion.*



Another way in which plants help the soil is by improving their mineral content. Dead and decaying plants thus serve as manure.

11. Other uses: Plants also give us dyes, inks, rubber, gums. They are used for decoration and as hedges.

**Things to remember**

1. Plants give us food, sugar, oil, spices, beverages, fibres, wood and medicines.
2. Green plants alone can prepare their own food. To do so they use water (from the soil), carbon dioxide (from the air) and energy (from the sun).
3. Starch turns blue on reacting with iodine.
4. Plants are a source of proteins, carbohydrates, fats, minerals and vitamins.
5. Green plants purify the atmosphere by giving out oxygen.
6. Oils got from plants are used for various purposes (in cooking, making medicines, perfumes and soaps).
7. Fibres from plants are used in making clothes, bags, twines and mats.



8. Wood is used in building, for furniture, for fuel and in paper-making.
9. Plant roots prevent soil erosion.

### Things to do

1. Pack different types of spices in small polythene bags and display them on your class display board with suitable labels.
2. Go round your living room and kitchen. Make a list of all the objects got from plants.
3. Write down the menu for today's dinner. Write which of them give you heat energy, which of them build up your body and which of them protect you from diseases. Example:  
 Lime rice    a. Rice — carbohydrates (provide energy)  
                   b. Lime and chillies — minerals and vitamins
4. Collect a few historical notes on voyages made for spices from Europe to India.
5. Make a chart on rubber products with suitable labelled diagrams. Hang it in your class room.

### Exercises

1. Answer briefly:
  - a. What happens to the excess food prepared by leaves?
  - b. What types of food do we get from plants?
  - c. Which plants give us sugar?
  - d. Name two plants that give us oil.
  - e. Name three spices that are used as flavours for food.
  - f. Give three example of beverages.
  - g. What type of fibre is commonly used for making clothes?
2. Answer in detail:
  - a. Write a few sentences on
    - i. soil erosion;    ii. storage of food in plants;    iii. medicinal plants.
  - b. How can the presence of starch in a food material be shown?
3. Tick the correct plant among those given in brackets:
  - a. sugar producing plant (groundnut, chillies, palm, eucalyptus)
  - b. oil producing plant (potato, coconut, bamboo, cassia)
  - c. plant that gives us a spice (brinjal, onion, clove, rose)
  - d. plant used in making beverages (beans, sesame, cotton, coffee)
  - e. plant used in making medicine (bacteria, tea, jasmine, cereals)
4. Tick the objects in this list that are obtained from plants and draw them.  
 bread, ball, pickle, chair, boat, car, brick, door, toffee, rope

5. Find the odd one out in each group and give reasons for your choice.
- a. cotton, flax, jute, rubber
  - b. cloves, sugarcane, ginger, chillies
  - c. jasmine, eucalyptus, clove, camphor
6. In what way are each of the following plants useful to us?  
Pick the answers from the words within brackets:  
(beverage, oil, sugar, medicine, spice, fibre)
- a. coconut
  - b. ginger
  - c. palm
  - d. eucalyptus
  - e. bacteria
  - f. tea

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## 4. Flowering and non-flowering plants

If you look around you, you will see a great many plants. Animals depend on plants for their food. In spite of plants being constantly eaten up by animals, we always find plants around us. How is this possible? This is so because plants reproduce to give rise to many more of themselves. According to the way in which they reproduce, plants can be grouped as flowering and non-flowering plants.

### Flowering plants

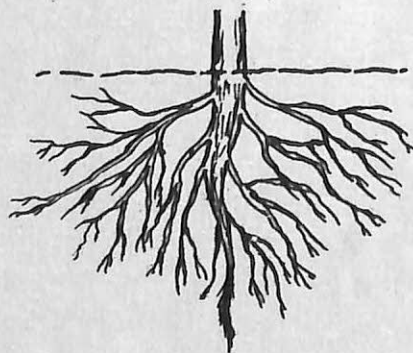
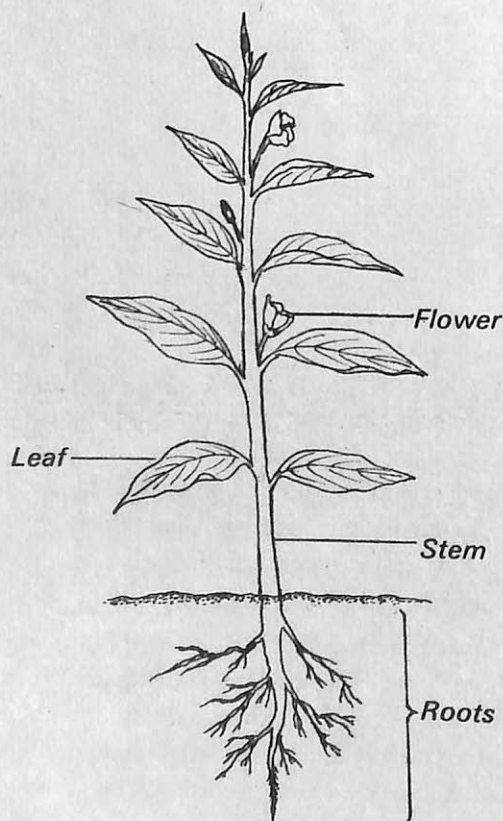
All flowering plants have four main parts — roots, stems, leaves and flowers. These plants reproduce

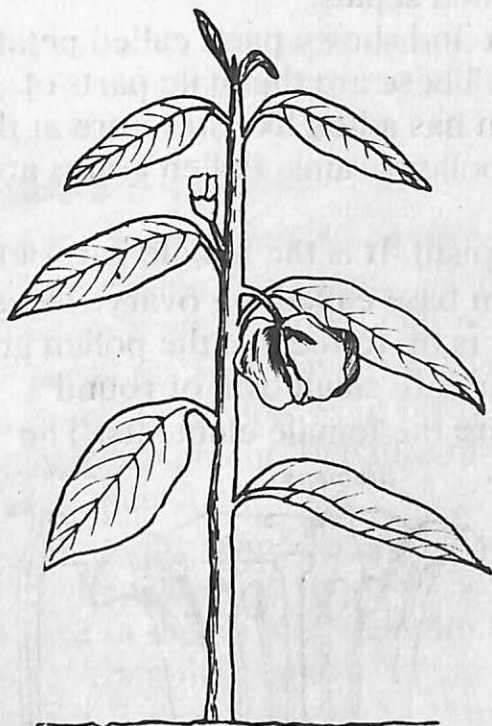
*All flowering plants have four main parts.*

through seeds. The seeds are produced by the flowers of the plant. Let us study the parts of a flowering plant.

**Roots:** If you carefully remove a flowering plant from the soil, you will see a number of roots with many smaller branches. These roots help to fix the plant firmly in the soil. They also absorb water and dissolved salts from the soil.

*Roots help to fix the plant firmly in the soil.*





*The stem is above the ground and bears the leaves.*

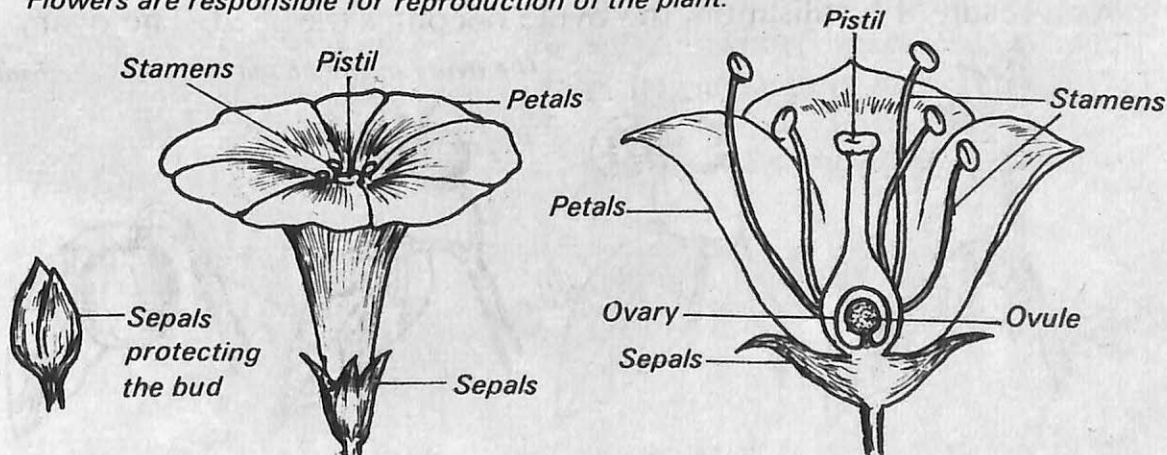
**Stem:** The stem is found above the ground. It bears the leaves. The stem is also useful to the plant. It holds the leaves in the best position so that they receive good sunlight. It also brings water with the dissolved salts from the roots to the leaves. The stem carries the foods prepared by the leaves to other parts of the plant.

**Leaves:** Look at the leaves of the plant. They are flat and green in colour. Do you see a number of lines which look like a net? The larger ones are the veins and the smaller form the veinlets. Leaves are essential for flowering plants. They manufacture food.

In order to do this they use water and mineral salts from the soil and carbon dioxide from the air, and energy from the sun. A green pigment (chlorophyll) in the leaves is responsible for preparing the food.

**Flowers:** Flowers may be white or coloured. The flowers are responsible for reproduction of the plant. Each flower has the following parts.

*Flowers are responsible for reproduction of the plant.*

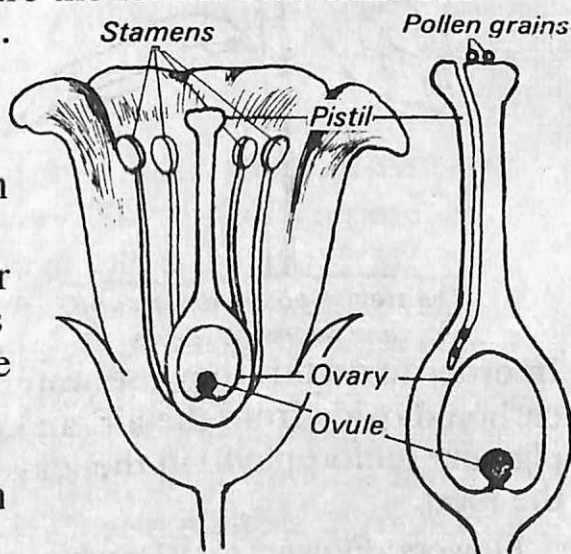




1. The outer, green leaf-like parts called sepals.
2. The bright, coloured or white, soft and showy parts called petals.
3. Within the petals are the stamens. These are the male parts of the flower. The stalk of the stamen has a box-like structure at the tip, which produces the powdery pollen grains. Pollen grains are the male elements.
4. Surrounded by the stamens is the pistil. It is the female part of the flower. It has a stalk with a swollen base called the ovary. The stalk has a sticky or a feathery knob at its tip to receive the pollen grains from other flowers. Inside the ovary are small oval or round structures called ovules. Ovules are the female elements. The ovules are protected by the ovary.

### Formation of seeds

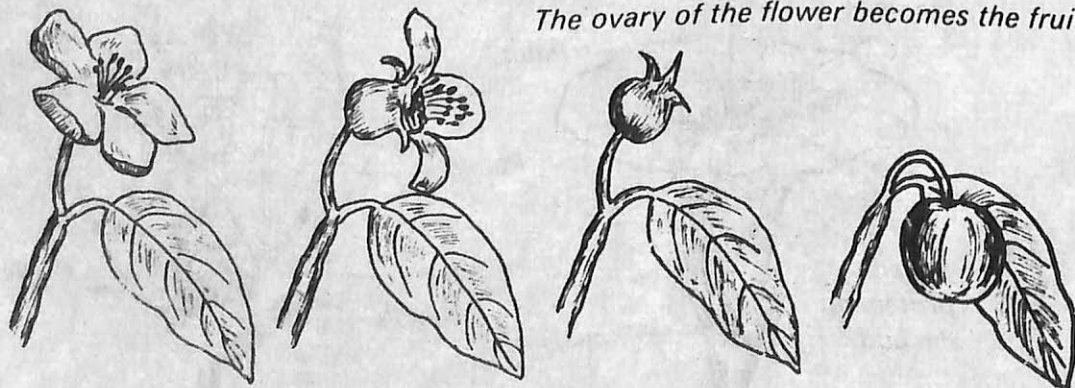
Fusion of the male element (pollen grain) with the female element (ovule) is called fertilisation. In order to reach the ovules the pollen grains have to travel from the stamen to the pistil. This is called pollination. Wind, water and animals help in pollination. Once pollen grains reach the pistil they travel down the inside of its stalk and reach the ovule, to fertilise it. This is how a seed is formed.



*Fusion of the pollen grain with the ovule is called fertilisation.*

As a result of fertilisation, the ovule becomes the seed. The ovary

*The ovary of the flower becomes the fruit.*



which surrounds the ovule now swells and becomes fleshy or becomes dry and hard. This is what we call the fruit. The fruit protects the seed.

### **Non-flowering plants**

Non-flowering plants do not have one or more of the four parts found in the flowering plants. Non-flowering plants are ferns, fungi, mosses, algae and bacteria. Out of these ferns, mosses and algae are green plants because they have the green pigment, chlorophyll, which is also found in the leaves of flowering plants. Fungi and bacteria do not have this pigment. Because of this they have to depend on other plants for their food.

Non-flowering plants, as you already know, do not grow from seeds. Instead, they produce spores. These spores are very minute and light. They float in the air and sometimes are so very tiny that they cannot be seen. When these spores fall in moist, shady, cool places they grow into plants. Let us study these plants.

1. **Ferns:** Ferns are common non-flowering green plants. They have roots, stems and leaves. The spores are small and are packed in spore-boxes. These appear as brown spots on the underside of the leaves. The spore boxes burst and scatter the ripe spores. The spores are thrown far away and grow into new plants. There are different types of ferns. The spore-boxes are arranged in different ways in each type.



*Spores on the underside of fern leaves.*



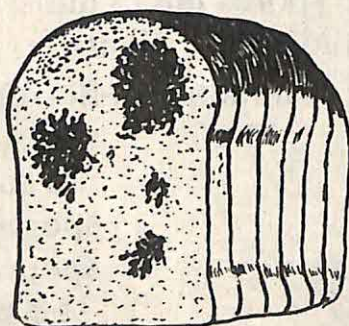
*Ferns are common non-flowering green plants.*



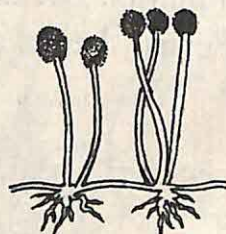
2. **Fungi:** These are non-flowering non-green plants. They do not possess roots, stems and leaves. Since they do not have chlorophyll, they cannot produce food by themselves. They depend on other plants and animals. Some fungi feed on dead plants and animals. The most familiar types of fungi are mushrooms and moulds. These, like ferns, reproduce by means of spores.

You must have seen a mushroom. Mushrooms are of different shapes. Some are larger than others. Some mushrooms can be eaten. But some types are poisonous. These types are called toadstools. If you look at the underside of the cap of a mushroom you will see what looks like the gills found in a fish. Within these gills spores are produced.

*The underside of the mushroom cap has gills within which spores are produced.*



*Moulds (enlarged)*



*Moulds grow on bread.*

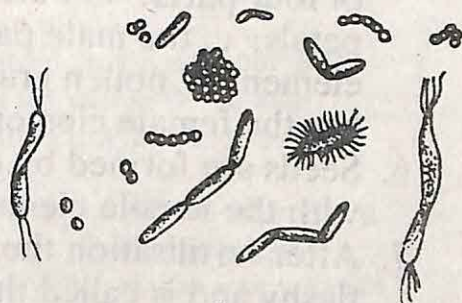
Moulds appear different from mushrooms. They are minute. They grow on bread, fruits and damp leather. Moulds have long threads which serve as roots to fix them down. From these threads arise thin tiny stalks which bear the spore-boxes at the tip. These open to release the ripe spores.

3. **Mosses:** These have stems and green leaves but no roots. Instead they have tiny threads that anchor the plant to walls, stones, tree trunks and other objects. They always grow in wet places. Spore-boxes are at the tip of long stalks. The spores are released from the spore box when the cap falls off. Sometimes the spore-boxes have holes through which the spores come out.





*Bacteria (enlarged)*



*Moss grows in wet places.      Algae are very simple plants.*

4. **Algae:** These are very simple plants and have no roots, stems and leaves. Some types of algae look like long green threads. Algae are found in damp places, in ponds, rivers and the sea. Seaweed is a kind of algae.

Most types of algae are green in colour. There are blue-green, red and brown algae too! The brown algae are called kelps. Algae also reproduce through spores.

5. **Bacteria:** Bacteria are very minute non-green plants. They cannot be seen by us. They are found in air, water and soil. As they have no chlorophyll, like fungi, they depend on other plants or animals for their food. Each bacterium has a single cell. This cell when fully grown divides into two. In this way one bacterium multiplies to produce many bacteria within a short time.

### **Things to remember**

1. Flowering plants reproduce through seeds. They have roots, stems, leaves and flowers.
2. Roots fix the plants in the soil. They absorb water and dissolved salts from the soil.
3. The stem bears leaves and exposes them to sunlight. It transports water from the root to the leaves and transports food from the



- leaves to other parts of the plant.
4. Leaves prepare food with the raw materials, water and carbon dioxide, using energy from the sun.
  5. Flowers are the reproductive parts of a plant. They are made up of four parts: a. outer green sepals; b. bright, coloured, soft petals; c. the male part called stamens which produces the male element — pollen grains; d. the female part called pistil which has the female element — ovules.
  6. Seeds are formed by the fusion of the male element (pollen grain) with the female element (ovule). This fusion is called fertilisation.
  7. After fertilisation the ovary surrounding the ovule becomes dry or fleshy and is called the fruit.
  8. The fruit protects the seed and helps in dispersal.
  9. Non-flowering plants reproduce through spores.
  10. Ferns, fungi, mosses, algae and bacteria are non-flowering plants.
  11. Ferns have roots, stems and leaves but no flowers. They prepare their own food. Spore-boxes are borne on the under-surface of the leaves.
  12. Fungi do not possess roots, stem, leaves or flowers. They cannot prepare food and depend on other plants and animals for their food. Mushrooms and moulds are fungi. Some mushrooms are edible. Others, like toadstools, are poisonous.
  13. Mosses have stems and leaves but no roots or flowers. They can prepare their own food.
  14. Algae have no roots, stems, leaves and flowers. They are able to produce their own food.
  15. Bacteria are single-celled minute plants. They can be seen only with a microscope. They are found everywhere. Most bacteria cannot prepare food and depend on other plants and animals for food. They reproduce by simple division of their cells.

### Things to do

1. Collect some flowers (like hibiscus).
  - a. Identify the following parts:
    - i. sepals; ii. petals; iii. stamens; iv. pollen box; v. pistil; vi. ovary.



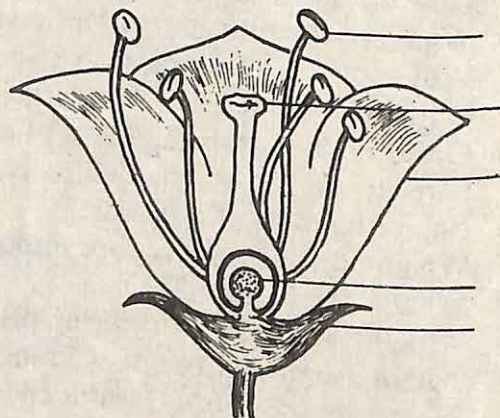
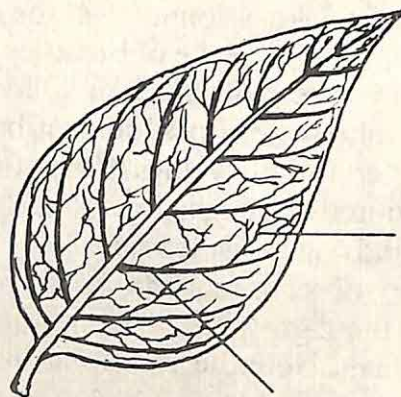
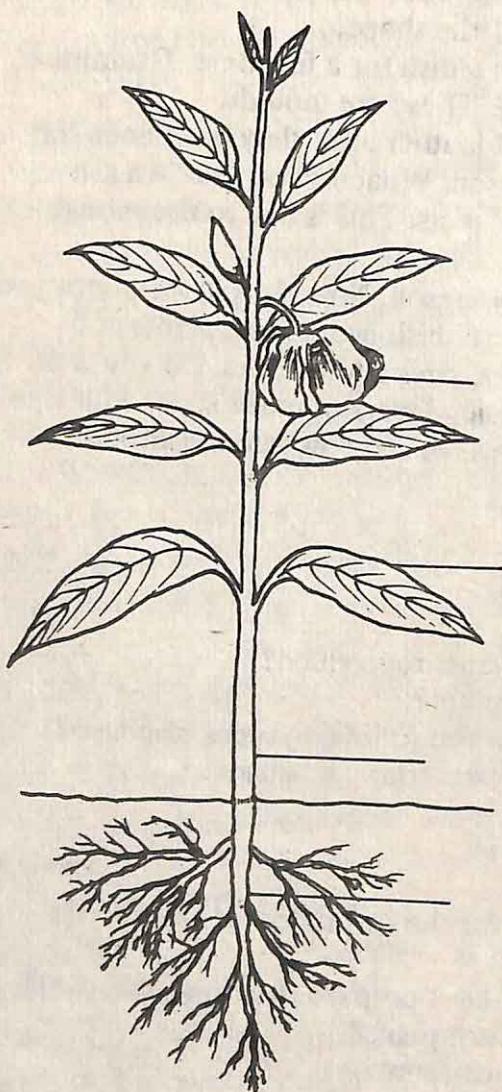
- b. Now carefully cut open the swollen ovary of the pistil as shown and see the ovules inside.
2. Examine the underside of fern leaves of different kinds. Look at the spore-boxes. Make a note of a. the colour; b. the shape.
3. Keep a moist piece of bread or coconut on a dish for a few days. Examine it. Can you see soft black or white structures? These are moulds.
4. Examine your shoes, belts or bags made of leather after they have been left unused for a few days during the rainy season. What do you see? An ash-coloured coating is found on the leather objects. This is due to the growth of moulds on moist leather.
5. Also, observe mushrooms during the rainy season. Note the places where you see them growing — on logs of wood, the rubbish heap, dead plants and animals. Note the variations in their shapes, sizes and colours. Do you want to grow mushrooms? You can do it by spreading layers of moist straw with ripe mushroom umbrellas. These liberate spores which grow into mushrooms!

## Exercises

1. Answer briefly:
  - a. How do flowering and non-flowering plants reproduce?
  - b. What are the four parts of a flowering plant?
  - c. Which of these four parts are missing in the following types of plants?
    - i. fungi; ii. mosses; iii. ferns; iv. bacteria; v. algae.
  - d. Give one important function of each:
    - i. root; ii. stem; iii. leaf; iv. flower.
  - e. Name the parts of a flower.
  - f. Which parts of a flower are important for the formation of seeds?
  - g. What is fertilisation?
  - h. Which types of non-flowering plants cannot prepare their own food? Why?
  - i. Where are the spore-boxes found in a fern plant?
  - j. Where are the spores produced in a mushroom?
  - k. How does a bacterium reproduce?
2. Answer in detail:
  - a. How does the stem serve the plant?
  - b. What are the parts of a stamen and a pistil? Draw suitable figures and name these parts.
  - c. How are seeds formed?
3. Write four sentences on each of the following:
  - a. ferns
  - b. fungi
  - c. mosses



- d. algae
- e. bacteria
- 4. Label the parts:



5. Match the following:

- a. green plants
- b. plants that depend on other plants and animals for food
- c. plants that have roots, stems and leaves
- d. green, non-flowering plant that has spores on the under side of its leaves
- e. plants that are single-celled

bacteria  
fern  
chlorophyll

non-green plants  
flowering plants

6. Fill in the blanks:

- a. Flowering plants reproduce through ..... and non-flowering plants through .....
- b. Roots absorb ..... and ..... from the soil.
- c. Stems carry ..... with ..... from the roots to the leaves and ..... prepared by the leaves to other parts of the plant.
- d. The larger lines on the leaf are called ..... and the smaller branches form the .....
- e. .... in the leaves is responsible for preparing the food.
- f. Pollen grains are the .....
- g. Ovules are the .....
- h. The swollen base of the stalk of a pistil is called .....
- i. After fertilisation the ..... becomes the seed and the ..... becomes the fruit.
- j. In order to reach the ovule, pollen grains have to travel from the ..... to the .....

7. Draw neat, labelled diagrams of a fern and a mushroom in your note book.



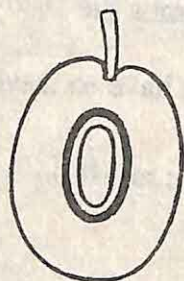
## 5. Dispersal of seeds and fruits

### Flowering plants reproduce through seeds

You have seen how the ovule becomes the seed and the ovary becomes the fruit. The seed contains an embryo (a miniature root and stem), along with food. When the seed falls on the ground it grows into a new plant.



Coconut

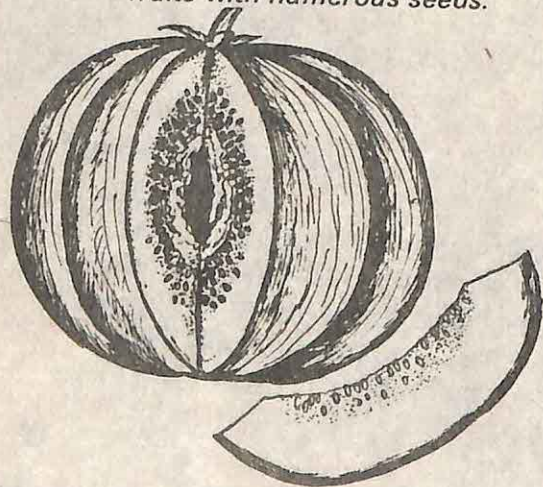


Plum

*Some plants produce fruits with a single seed.*

and space. In order to avoid such overcrowding, seeds of most plants travel far away from the parent plant. This spreading or scattering of seeds to distant places is called dispersal. Dispersal also helps plants to widen their distribution over the earth's surface.

*Some plants, like pumpkins, produce fruits with numerous seeds.*



Some plants like mango, coconut and plum produce fruits with a single seed. Other plants like cucumbers, pumpkins, melons are capable of producing fruits with numerous seeds. Imagine what would happen if all these seeds were to grow around the parent plant. There would be extreme competition for food, water, light.

Since all plants are stationary and fixed to the ground they depend upon certain agents, or devices, to bring about dispersal. The main agents of dispersal are wind, water and animals. Some plants do not depend on these agents but have explosive mechanisms to disperse their seeds.

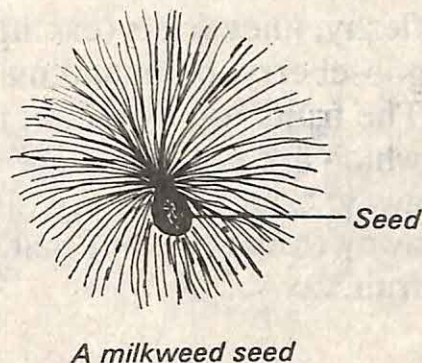
Depending on the type of agent, seeds are adapted for their travel. In some cases the fruits also help in dispersal (examples: mango,



apple, coconut). Let us learn more about seeds and their travels.

### Dispersal by wind

Seeds of plants such as grasses, cotton and weeds travel by wind. Seeds of plants that travel by wind are very small, dry and light so that they can be easily carried. Some may have special parts to be easily carried by wind such as fluffy hairs or papery wings. For example, seeds of drumstick have papery wings and seeds of milkweed and of cotton have fluffy hairs on them which act like parachutes.

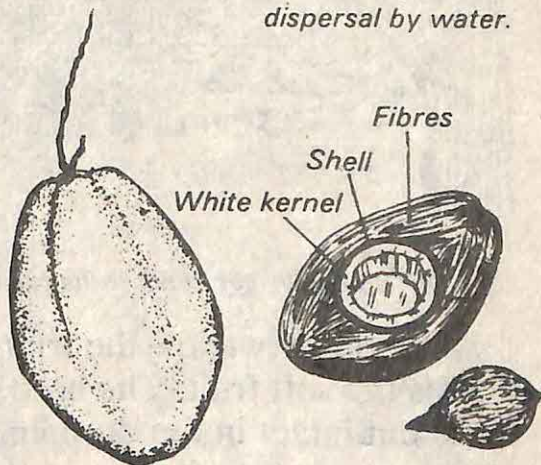


### Dispersal by water

Plants that grow in water such as the lotus and the lily use the water as a convenient dispersal agent. Seeds of lilies are small and light. Seeds of lotus are held by the fleshy stalk of the flower which acts like a boat and carries the seeds far away. Not only plants growing in water, but plants growing on the seashore and on banks of rivers and ponds also use water for dispersal of seeds.

One such common plant is the coconut. The fruits of this tree are fibrous. This fibrous package helps the seeds in many ways. It serves as a water-proof covering. Air trapped between the fibres makes the package light so that it floats. The seed also has a hard shell which protects it against damage caused by rocks. The ripe fruits fall from the trees which grow near the coast and are safely carried by the sea to

*The coconut is adapted for dispersal by water.*

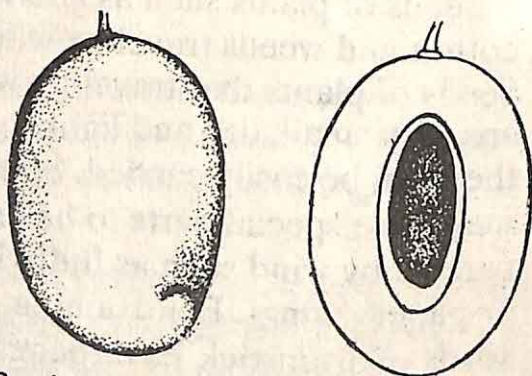




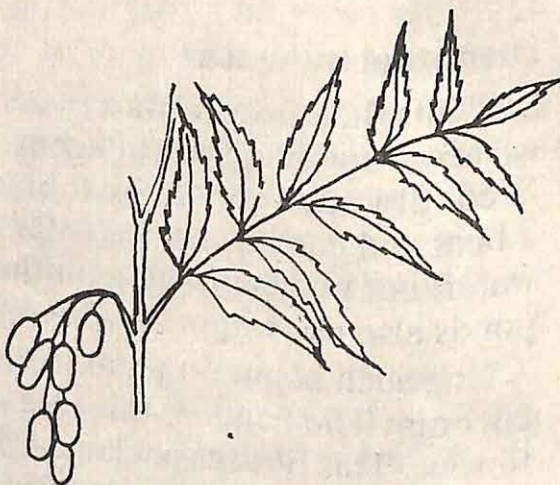
some distant land. After a period the outer coat decays and the seeds are freed to grow into new plants.

### **Dispersal by animals.**

Most seeds that travel with the help of animals or birds have tasty, fleshy, juicy fruits (example: gooseberry, plum and mango). The fruits are eaten but the seeds which are not edible are thrown away. Usually they are discarded far away from the plant that bears the fruit.



*Seeds that travel with the help of animals have tasty, fleshy fruits, like the mango.*



*When crows eat neem fruits the undigested seeds come out in the droppings.*

Some birds swallow the fruit whole along with the seeds. The bird digests the soft fruit. The hard, dry seeds within are not digested and come out intact in the droppings of these birds. This happens when crows eat neem fruits. Squirrels also help in seed dispersal. They

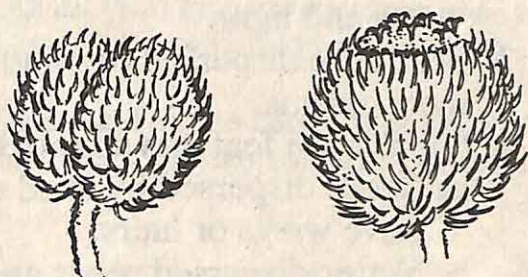


collect nuts and store them for future use. Some of these may be left undisturbed and grow into new plants.

*Squirrels collect nuts and help in seed dispersal.*



Many fruits or nuts take a ride on animals, persons or birds. They catch these rides by special means. The fruits or nuts are small, dry,

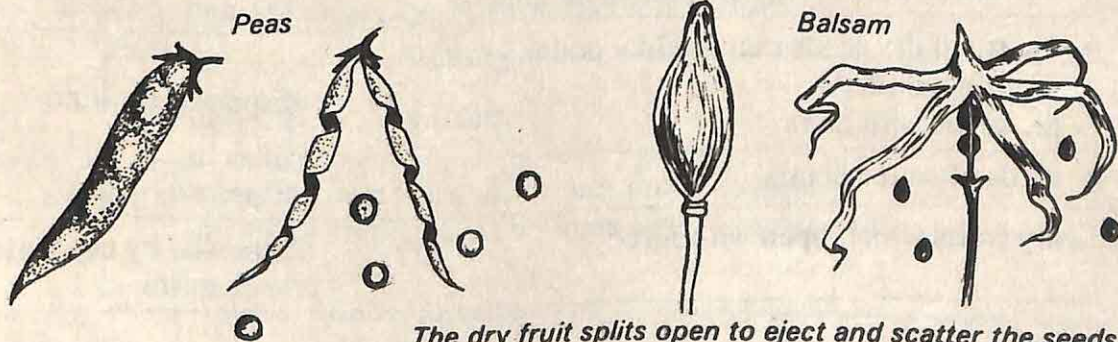


*Curved hooks, thorns or spines help some fruits, seeds or nuts to catch rides on animals.*

have curved hooks, thorns or spines. These sharp prickles help the seeds to attach themselves to the fur or hair of animals or to feathers of birds. Many water birds also help in dispersal. The seeds attach themselves to the birds as they wade in water and are then carried from one pond to another.

### **Dispersal by explosive mechanisms**

Here the fruit is very helpful in dispersal of seeds. The seeds are packed within the fruit which gradually becomes dry. The dry fruit then splits open with a certain force just like an exploding fire-cracker. This force ejects and scatters the seeds to a considerable



*The dry fruit splits open to eject and scatter the seeds.*



distance, like bullets from a gun. Examples of plants which disperse seeds in this way are pea, castor and balsam. The dry fruits of pea and bean are commonly known as pods.

### Things to remember

1. Spreading or scattering of seeds to distant places is called dispersal.
2. Dispersal avoids overcrowding of plants and competition for food, water and light.
3. Seeds are dispersed by wind, water, animals and explosive mechanisms.
4. Seeds have features adapted for their dispersal.
  - a. Seeds dispersed by wind are small, dry and light. Some may have wings or hairs.
  - b. Water-dispersed seeds are light and small and have water-proof coverings. Because of these they are able to float.
  - c. Seeds dispersed by animals and birds usually have tasty, fleshy fruits. The seeds are hard and cannot be digested. Some seeds are dry with hooks, thorns or spines which attach them to the fur of animals, or to our clothes.
  - d. Fruits of certain seeds dry up and explode with a certain force to eject their seeds to distant places.

### Things to do

1. Collect seeds of different types. Check each type against the table given below to find out to which group it belongs and how it is dispersed.

|    |                                                                                             |                                  |
|----|---------------------------------------------------------------------------------------------|----------------------------------|
| a. | i. fleshy fruits<br>ii. nuts<br>iii. seeds with thorny structures or spines                 | dispersed by animals             |
| b. | i. small dry seeds that are like pollen grains<br>ii. winged seeds<br>iii. seeds with hairs | dispersed by wind                |
| c. | seeds of water plants                                                                       | dispersed by water               |
| d. | dry fruits which open with force                                                            | dispersed by explosive mechanism |



2. Take a bucket or a tub of water. Get a coconut with the outer fibres intact. Put it in the water. Note whether it floats or sinks. Now peel away the outer fibres to expose the inner seed. Check if the seed is wet or dry. Then float it in water. Does it sink or float?  
What do you understand from this experiment?
3. Collect seeds with fluffy hairs or papery wings. Drop them from a considerable height. See how they fly away. Now remove the wings or the hairs. Let them fall from the same height. Do they now fly as they did before?
4. Examine the fruits of weeds. Note that most of them have spines or stiff hairs that enable them to get dispersed by animals. Wild grasses like spear-grass have tiny fruits which are like spear-heads. They stick to your clothes and prick you.
5. Look out for plants growing on broken walls and on the bark of old tree trunks. How could their seeds get lodged in these places? Perhaps squirrels dropped the seeds there.

### Exercises

1. Answer briefly:
  - a. Why do plants depend on dispersal agents?
  - b. Give two examples of plants in which the fruit helps in dispersal.
  - c. What are the agents of dispersal?
  - d. How are the seeds of a lotus dispersed?
  - e. How do squirrels help to bring about dispersal?
2. Answer in detail:
  - a. How does dispersal of seeds help plants?
  - b. Explain the adaptation of seeds that travel by wind. Draw suitable figures.
  - c. Describe the dispersal of seeds in the case of coconuts.
  - d. How do birds help in dispersal of seeds?
3. Complete the following sentences choosing phrases from the box:
  - a. Seeds that are dispersed by wind .....
  - b. Seeds that are dispersed by water .....
  - c. Seeds that are dispersed by animals .....
  - d. Seeds that are dispersed by explosive mechanism .....

have fleshy tasty fruits.

have dry fruits.

are small, light and with water proof covering.

are small and light, sometimes with parachute-like outgrowths.



4. Find out the correct fruit or seed choosing from the examples given below:  
(balsam, coconut, cucumber, mango, drumstick)

- a. a large fruit with numerous seeds
- b. a seed that has wings
- c. a seed with a fibrous package
- d. a fruit that is fleshy and edible
- e. a fruit that explodes to liberate its seeds

5. Find out how I travel.

- a. I am light and have hairs. I travel by .....
- b. I am big and fibrous. I travel by .....
- c. I am small, with wings. I travel by .....
- d. I am juicy and tasty. I travel by .....
- e. I am caged in a pod. I travel by .....
- f. I am small and have hooks. I travel by .....

## UNIT III ANIMAL LIFE

### 6. Useful animals

Man cannot live without the help of animals. They are important in keeping the balance of nature and supply him with food and other useful products. Birds and bees bring about seed dispersal and pollination and so help in plant reproduction.

Animals can be grouped as domestic animals and wild animals. Domestic animals are those that are tamed and cared for by man. Wild animals are those that roam free in the forests, shrubs, woods and mountains. Both types of animals are useful to man.

#### Our domestic animals

One of the first animals to be tamed by man was the dog. Man used dogs in hunting other animals. Later he tamed a number of other animals that provided him with food and clothing, or served as beasts of burden. Animals like dogs and cats were also bred as companions and, of course, for their beauty and grace. Let us study our domestic animals and find out how they are useful to us.



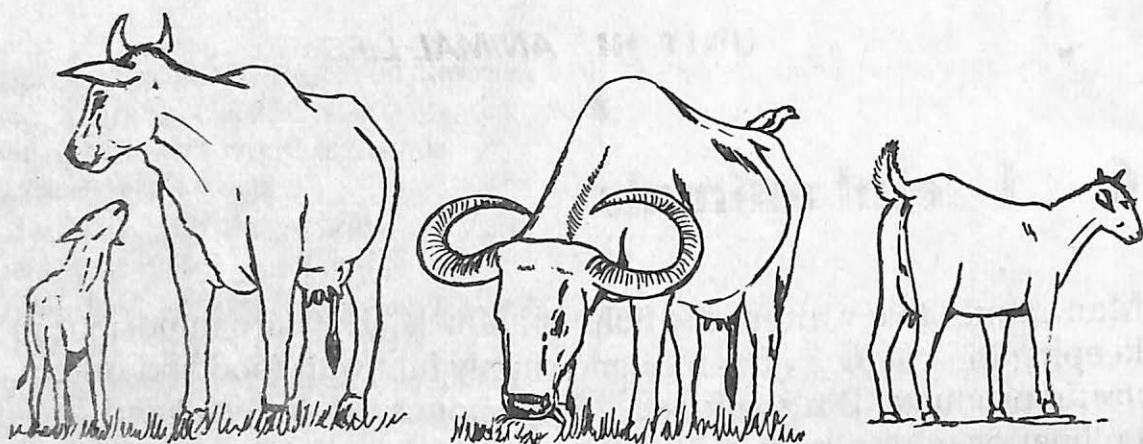
*Man first domesticated the dog.*

#### Livestock

Our livestock consists of animals like cows, buffaloes, sheep, goats and pigs. There are different varieties of these animals and they are reared for different purposes, some of which are given below.

1. Milk and milk products: Cows, buffaloes and goats are the main source of dairy products. Milk products include cream, cheese, curd, butter, ghee and milk powder. Buffaloes yield more milk than

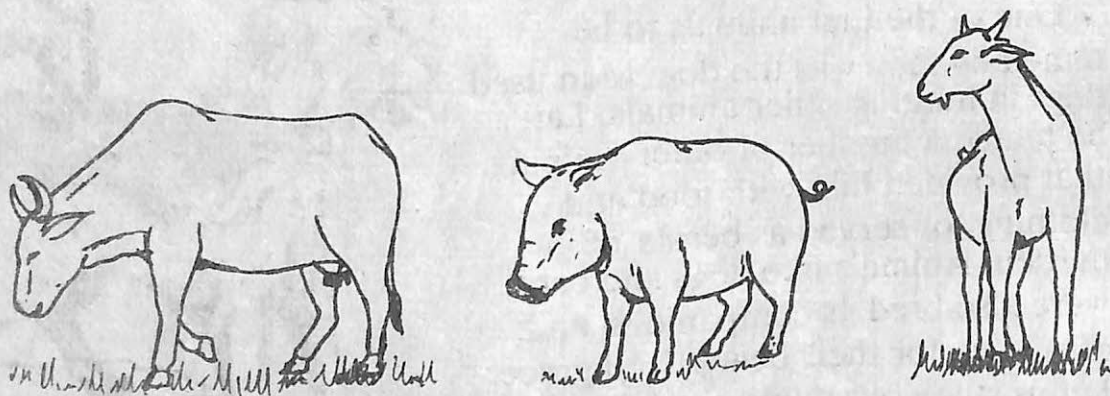




*Cows, buffaloes and goats form part of our livestock.*

cows. They are also better adapted to our hot climatic conditions as well as being more disease-resistant.

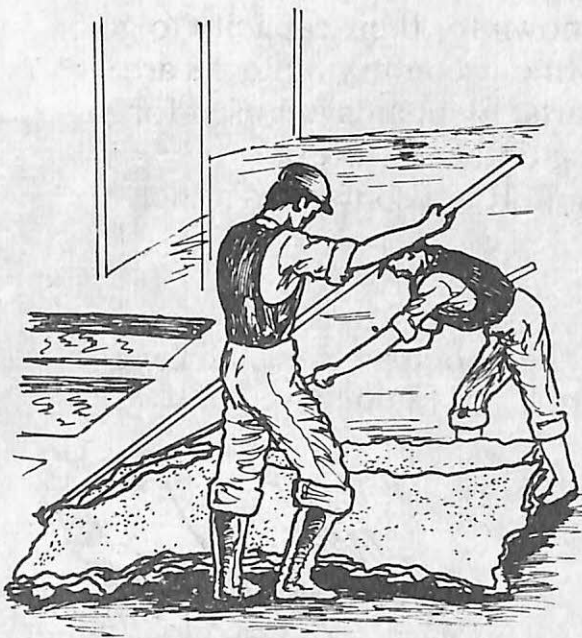
2. Food: The flesh of any animal is meat. But commonly eaten meat comes from cattle (beef), pigs (pork) and sheep (mutton). Meat is rich in protein, fats, vitamins and minerals.



*Commonly eaten meat comes from cattle (beef), pigs (pork) and sheep or goats (mutton).*

3. Skin: The skins of animals are used for various purposes. The hides of cattle are utilised for making leather. Leather is used for making shoes, bags, straps and belts.

Wool is got from the warm, fleecy hair that covers the body of domestic sheep. Different kinds of sheep have varying qualities and amounts of wool. Neglect and poor feeding of sheep can produce coarse wool.



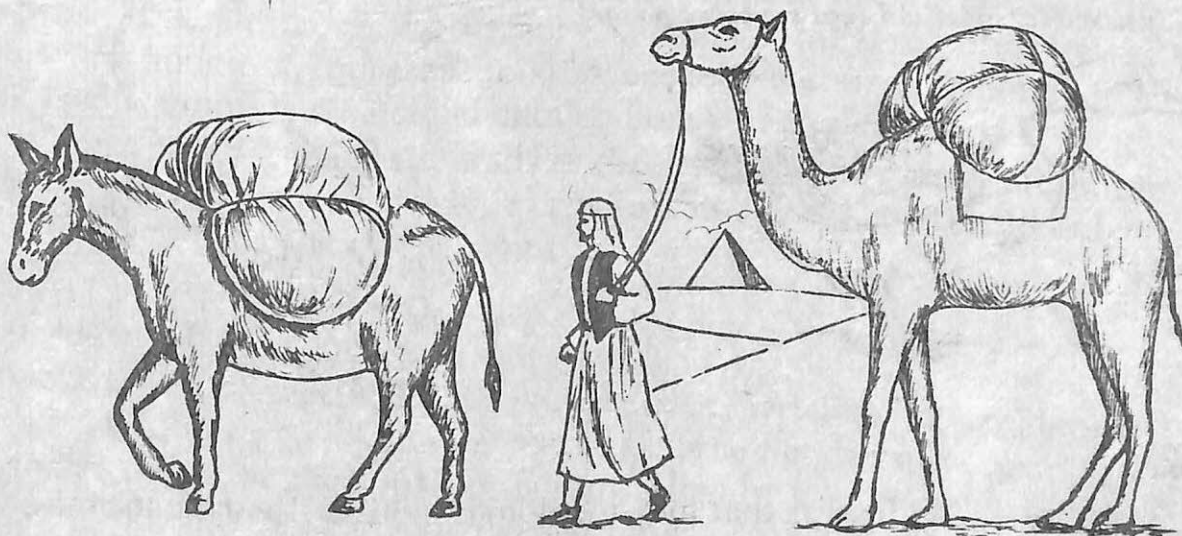
*Leather is made from animal skins.*



*Wool is got from the fleecy hair that covers the body of sheep.*

Hoofs and horns of livestock are used in making combs and handles.

4. Labour: Horses, donkeys, mules and camels are reared for carrying loads and pulling vehicles. Donkeys and mules are very sturdy



*Donkeys and camels are among the animals that are reared for carrying loads.*



animals that can withstand tough climatic conditions. Camels — the ships of the desert — are well-known for their capacity to go without water for a very long time. In our country bullocks are used to plough the fields and pull carts. Elephants are used for heavy work like shifting and carrying timber in forests.

5. Manure: Cattle dung enriches the soil. It is also used as a fuel.

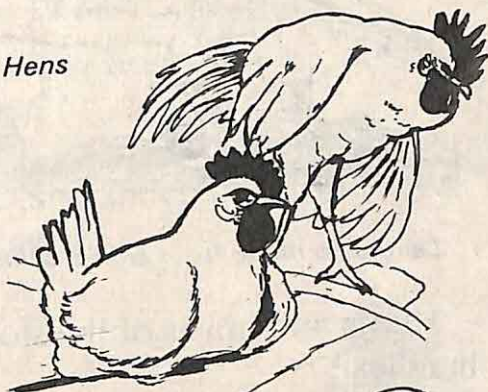
## Poultry

Birds raised for meat and eggs are called poultry. Hens, turkeys, ducks and geese are the most important kinds of poultry. These are raised in large numbers in farms.

Poultry farms may specialise in raising either egg-laying birds or meat-producing birds. To hatch birds which are to be raised and kept for egg-laying, poultry farmers use incubators called hatcheries.

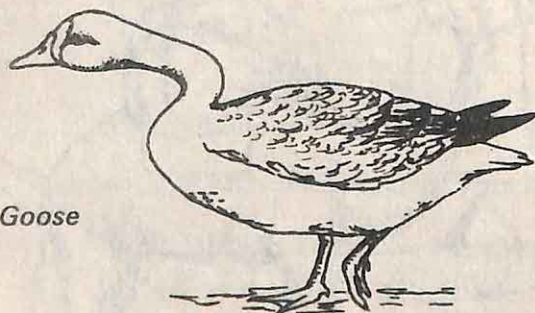
Meat-providing chicken have to be fed carefully to get good meat. Chicken meat is rich in protein.

*Hens*

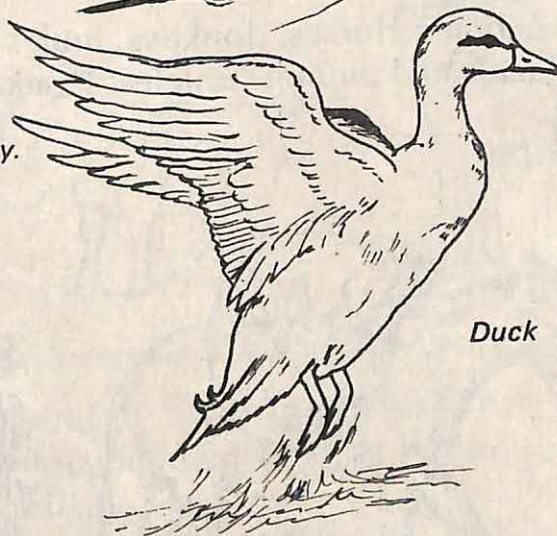


*Birds raised for meat and eggs are called poultry.*

*Goose*



*Duck*



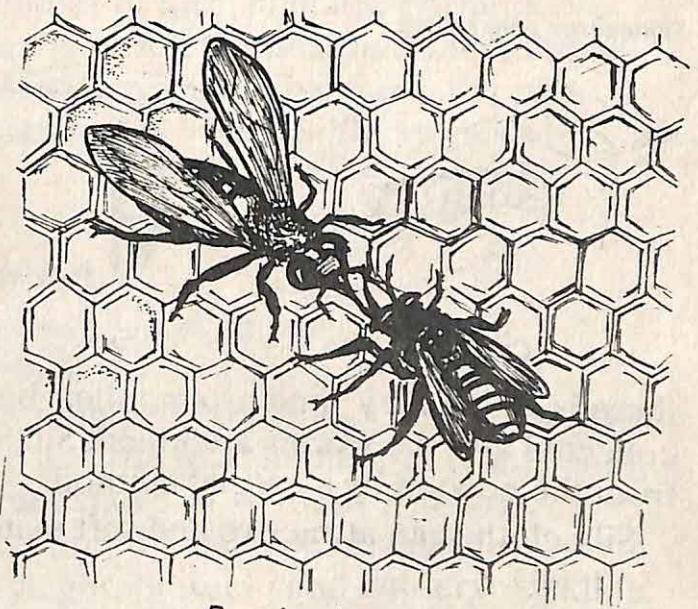
## Bees

Bees are social insects that live in colonies in hives. In ancient times people stole honey from the hives of wild bees. Beekeepers nowadays





*A wild beehive in a hollow tree*



*Bees in a honeycomb*

build special hives for rearing bees. Rearing of bees is known as apiculture. Bees give us honey which we use in cooking, as a sweetener, and in medicines. We use the wax from the hives of bees in making products like candles and lipstick.

How and why do bees make honey and wax?

Bees gather nectar and pollen from flowers. The nectar brought from the flowers is changed into thick, rich honey in the bodies of the bees. This is stored in the cells or chambers of the honeycomb. Bees use the honey and pollen as food. A beekeeper collecting honey from a beehive must leave behind enough honey to feed the bees.

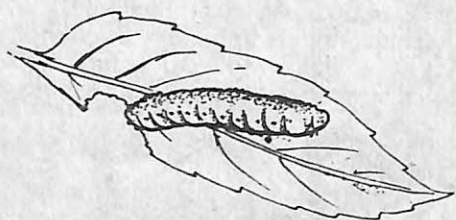
Wax is used to build the walls of the cells. Special glands present in the bodies of the bees produce beeswax. Beeswax is produced only when bees build their honeycomb.

## **Silkworms**

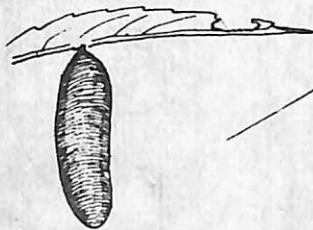
Silkworms give us silk. The worms are the larvae or caterpillars of the silk moth. The worms are reared in large numbers to obtain silk. Raising silkworms is called sericulture. Healthy worms which hatch out of eggs are given mulberry leaves to eat. After about twenty-five days these worms spin their silk cocoons. The worms make silk



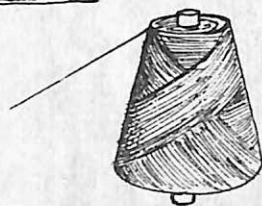
*Silkworms give us silk.*



*Caterpillar*



*Cocoon*



*Silk thread*



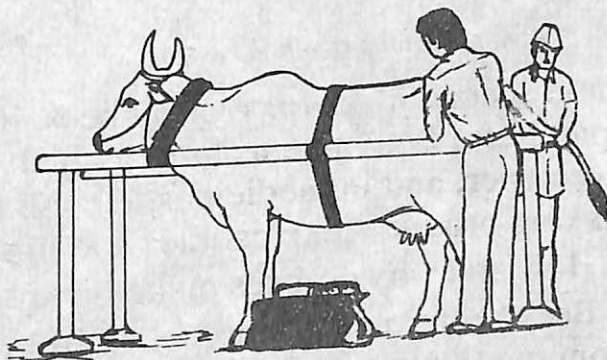
*Silk sari*

threads which they wind around their body. The cocoons are collected and the worms are killed. Silk threads are then unwound from the cocoon by a special method.

Silk cloth is an attractive and soft material for clothing.

### **Animal health**

You have read about the usefulness of domestic animals. Rearing these animals should be done carefully to get the best quality and yield. There are many aspects to looking after these animals.



*A veterinarian with a cow*

1. Food: One important aspect of rearing animals is providing them with the proper diet. This means giving food in correct quantities. Also, the food should be nutritious and balanced including all the major foodstuffs (carbohydrates, proteins, fats), vitamins and minerals, so that they grow well and keep healthy. Laying hens need a diet rich in calcium for producing strong egg shells.
2. Shelter: An ideal farm that houses livestock should provide:
  - a. good ventilation and plenty of sunlight;
  - b. clean, dry shelter;
  - c. plenty of space to house the animals, without overcrowding;
  - d. clean and fresh food;
  - e. good drainage system to clear off urine and dung.
3. Health: Animals suffer from many diseases. Some of these can

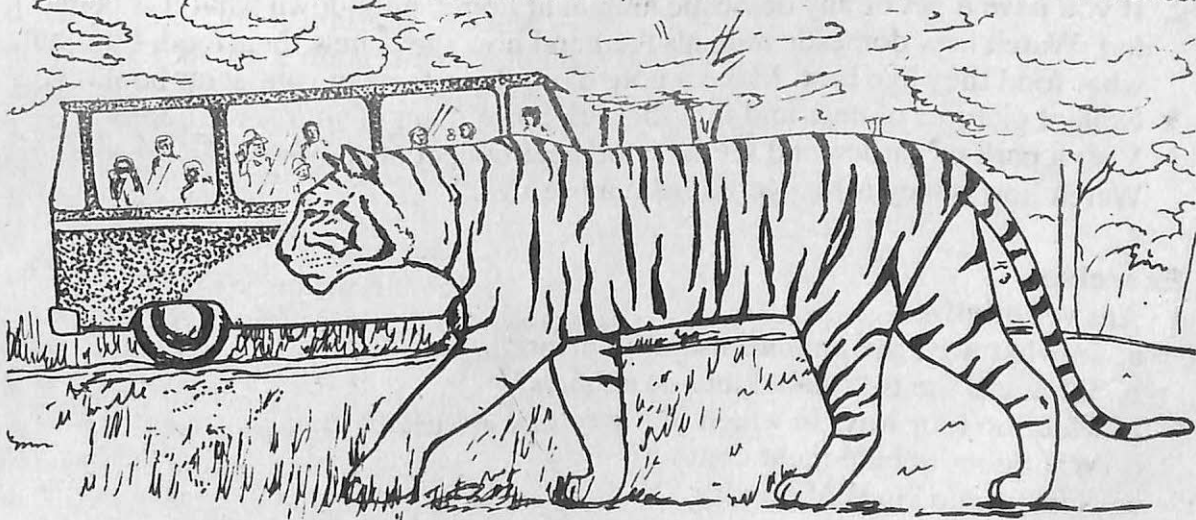
cause the death of a large number of farm animals. Farmers and veterinarians should periodically check the health of the animals. Some diseases can be prevented by vaccinating young animals. Diseased animals should be separated from healthy ones and treated.

### **Our wildlife and its conservation**

Domestic animals are not the only useful animals. We must remember that every kind of animal plays a part in the balance of nature. Some animals help other animals and plants. Others destroy plants and other animals. In this way the total number of plants and animals in a particular area is kept stable. If we destroy a large number of wild animals, we will upset the balance of nature. People all over the world are trying to preserve and conserve wildlife. These are some of the methods of conservation.

1. Laws have been made which prohibit poaching and killing of wildlife.
2. Preserving forests and other places in which wild animals can live. The reserve forest area should not be used for cultivation of crops or for building dams and reservoirs.
3. Countries now have national parks and sanctuaries where wild animals are kept protected and healthy in the wild state.

*Wild animals are protected in national parks and sanctuaries.*





## Things to remember

1. Animals can be divided into domestic and wild animals.
2. Our livestock (cattle, goat and pigs) give us
  - a. milk and milk products;
  - b. food;
  - c. leather, wool;
  - d. labour;
  - e. manure.
3. We get meat and eggs from poultries. Eggs and chicken meat are rich in protein.
4. Bees give us honey and wax. Honey is made from nectar and is used as food by the bees. Wax is produced by special glands in the body of the bee and is used to build the honeycomb.
5. Silk is obtained from the larvae of the silkworm. They make silk to form their cocoons. The worms are killed to obtain the silk.
6. Care of domestic animals involves:
  - a. giving them the proper diet;
  - b. keeping them in clean, healthy surroundings;
  - c. prevention and treatment of diseases.
7. Wildlife plays an important role in the balance of nature. Wild animals have to be conserved. Many conservation measures are now being taken.

## Things to do

1. Visit these places and write about what you see there.
  - a. a dairy farm
  - b. a zoo
  - c. a poultry farm
2. If you have a pet or any domestic animal at home, note down what it is being fed. Watch how domestic animals feed and how they chew their food. Find out what food they like best. Make a note of all these facts in your scrapbook.
3. Collect pictures of bees and their homes. Paste them in your scrapbook.
4. Visit a park or garden and see how the bees collect nectar from the flowers. Watch how honey is recovered from a beehive.

## Exercises

1. Answer briefly:
  - a. In what ways are animals useful to plants?
  - b. What are the two main kinds of animals?
  - c. Mention four ways in which our livestock are useful to us.
  - d. What does animal meat contain?
  - e. Name some kinds of poultry.



- f. What is apiculture?
  - g. Why is honey made by bees?
  - h. Which insect gives us silk?
  - i. What is sericulture?
  - j. How does vaccination help animals?
  - k. Why should we conserve wildlife?
2. Answer in detail:
    - a. What are the animals that are used for labour? How do they help us?
    - b. Write five sentences on poultry farming.
    - c. How do bees make honey and wax?
    - d. List the things that any farm should provide for proper housing of domestic animals.
    - e. What efforts have been made to conserve wildlife? Explain.
    - f. What are the three important aspects of animal care?
  3. How are these animals useful to us?
    - a. buffalo
    - b. duck
    - c. bee
    - d. camel
    - e. pig
    - f. silkworm
    - g. sheep
    - h. tiger
  4. Complete the following:
    - a. Most commonly eaten meat comes from .....
    - b. Man tamed a number of animals because .....
    - c. Poultry farms may specialise in either .....
    - d. Bees make honey and wax because .....
    - e. Proper food for a domestic animal must contain .....
  5. Tick the correct sentences. Correct the ones that are incorrect.
    - a. Wild animals are dangerous and so have to be killed.
    - b. Buffaloes yield more milk than cows.
    - c. Wool is got from goat's skin.
    - d. Cattle dung enriches the soil.
    - e. Bees gather pollen for their food.
    - f. It is useful to clear forests and raise food crops in their place.
  6. Draw neat diagrams of the following:
    - a. a silk cocoon
    - b. any domestic animal
    - c. any wild animal
    - d. a honeybee



## 7. Changes in weather

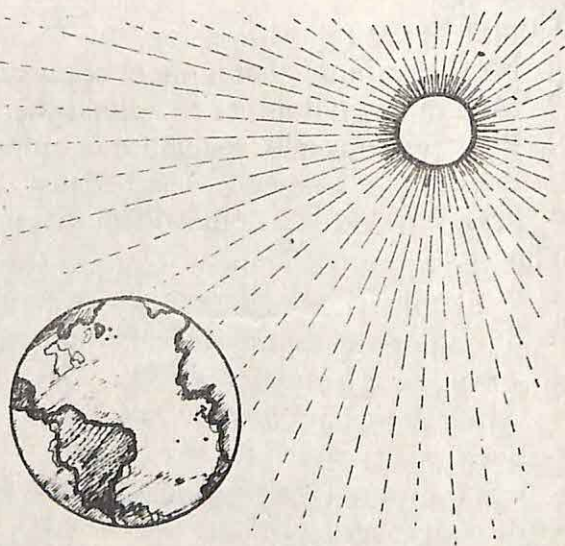
### What is weather?

You have learnt that the sun, wind, moisture in the air, clouds and rainfall determine the weather in a particular place. Weather is thus a combination of all these things in the atmosphere, present at one time in a particular place.

### Influence of the sun on weather

You know how the heat of the sun warms the surface of the earth as well as all the man-made solid masses such as buildings and roads. Much of the warmth of the air is not received from the sun's rays which pass through it during the day. Air is actually warmed as it touches the warm objects on the earth.

The earth's surface does not store up the heat that it receives from the sun. Solids get heated quickly and they also give off heat to their surroundings quickly. Warm objects send out heat as rays, to their surroundings, in the same way that they receive heat from the sun. Heat thus given off is said to be in rays or radiations. The earth's surface gives away heat to the atmosphere that surrounds it only through radiations.



*The heat of the sun warms the surface of the earth.*

During the day time when the sun is shining, heat is received by the earth from the sun faster than it radiates away from its surface.



Therefore, objects on the surface of the earth get warmer and warmer from sunrise until noon.

In the afternoon, the heat received from the sun gradually becomes less and, after sunset, no more heat is received from the sun. So the temperature begins to drop gradually, once the heat received is reduced. That is why it is very cool early in the morning before sunrise and the air gets warmer through the day. The day is hottest at noon and for a little while after that. Once again, it gets cool in the evening. During the night, the earth continues to radiate heat from its surface and the atmosphere gets cooled until the sun rises again. That is why the day temperature is higher than the night temperature.

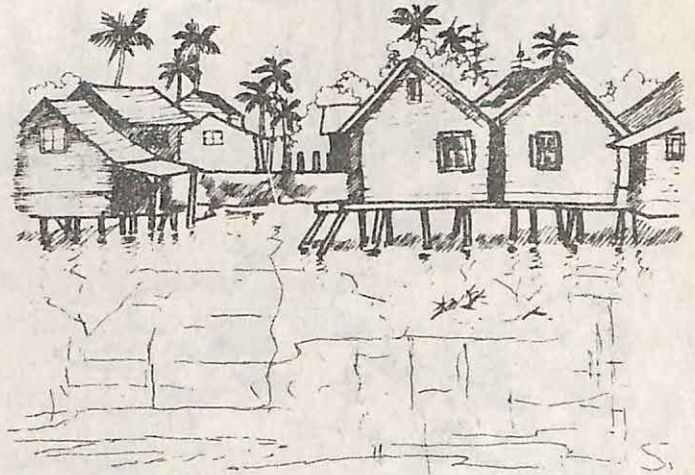
If there is not enough loss of heat through radiation from the earth's surface during the night, we experience a lot of discomfort and we are not able to sleep. This happens in summer. In winter, the radiation is so rapid that the night becomes very cold, which is again a discomfort. Thus we understand that the weather changes from hour to hour, day to day and season to season.

*Man has learnt to choose the right type of clothing and shelter to suit the weather.*

*Eskimos in Alaska*



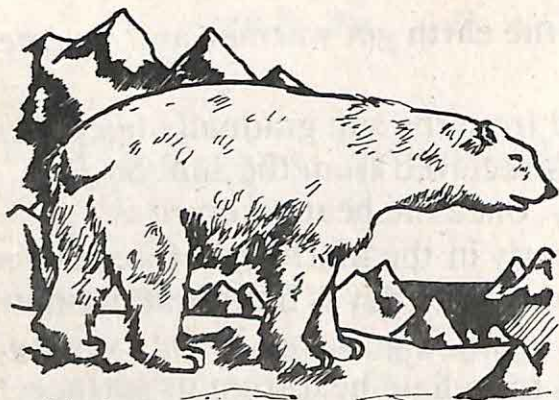
*Houses on stilts in a wet, tropical land*



### **Influence of weather on living things**

Man lives in places with changing weather conditions. He has learned to understand his surroundings and know how to choose the right type of clothing and shelter in a particular weather condition.



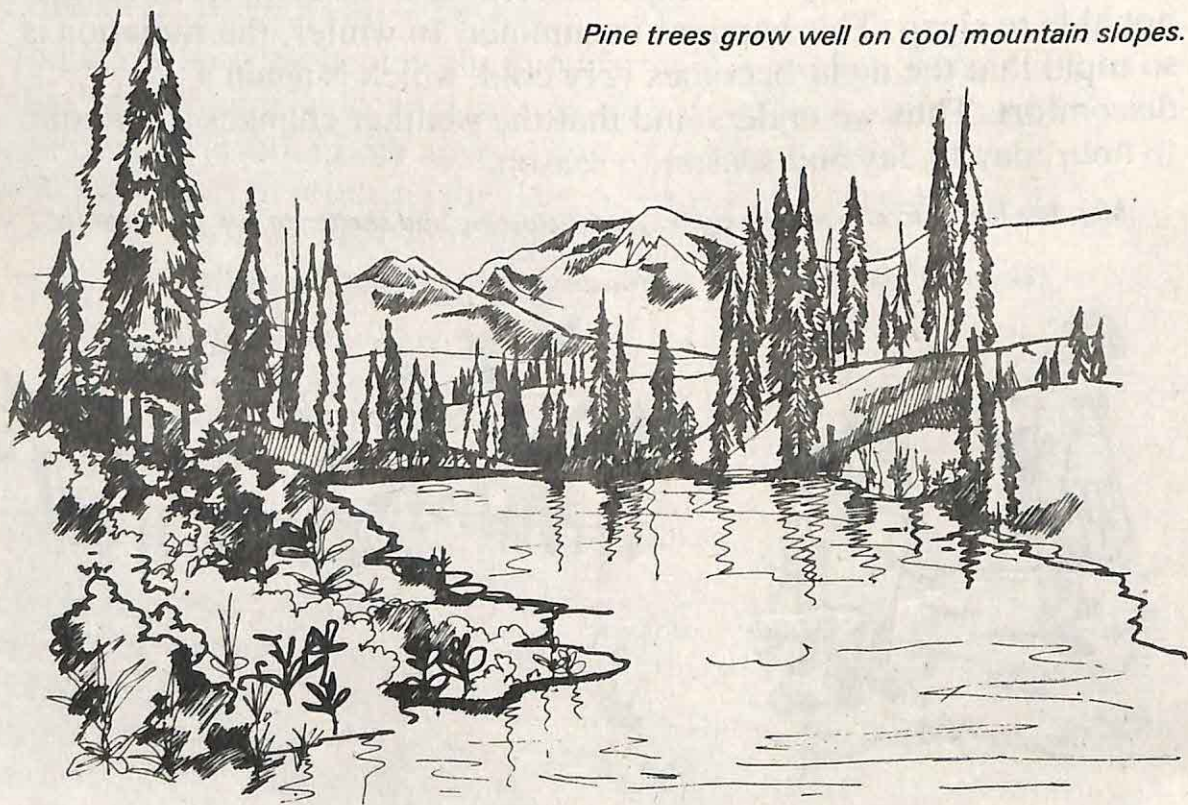


*A polar bear can live only in a cold place.*  
in a zoo. So also, pine or eucalyptus trees never grow so well in the hot plains as they do on cool mountain slopes.

Similarly he has learned to grow plants and domesticate animals to suit the place where he lives.

Wild plants and animals can live only in places which have weather conditions that would suit their body structure. For example, a polar bear cannot live in the tropics unless it is provided with artificial cooling systems as is done

*Pine trees grow well on cool mountain slopes.*

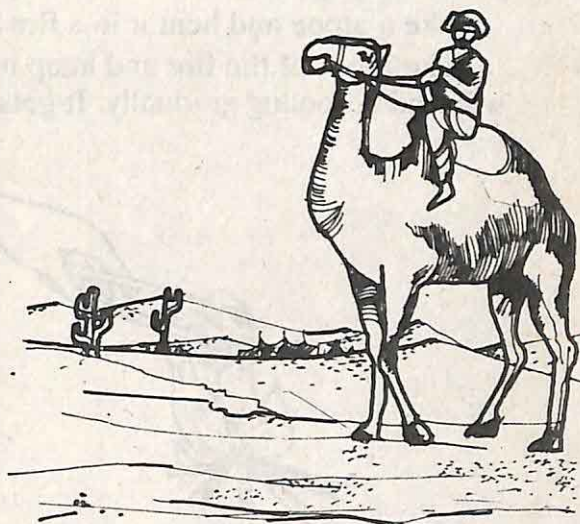


Man cultivates only a particular crop in a particular season, in a particular region of the earth. Otherwise unsuitable weather conditions will damage his crops and affect the yield.





*Man cultivates only a particular crop in a particular season in a particular region.*



*Man has learnt to domesticate animals to suit the place where he lives.*

### **Things to remember**

1. The sun, wind, moisture in the air, clouds and rainfall determine the weather in a particular place.
2. The heat of the sun warms the surface of the earth.
3. Solids get heated very quickly and give out heat in the same way.
4. The earth's surface gives out heat received from the sun through radiation.
5. The atmosphere gets heated more through radiation than by the sun's rays which pass through it during the day.
6. The weather changes from hour to hour, day to day and season to season.
7. The weather influences life on earth.
8. Man lives in places with changing weather conditions and has learned to understand his surroundings well.
9. He has also learned to grow useful plants and keep animals well-suited to a particular place and weather.
10. Wild plants and animals can live and grow only in those places where the weather is suited to their growth.

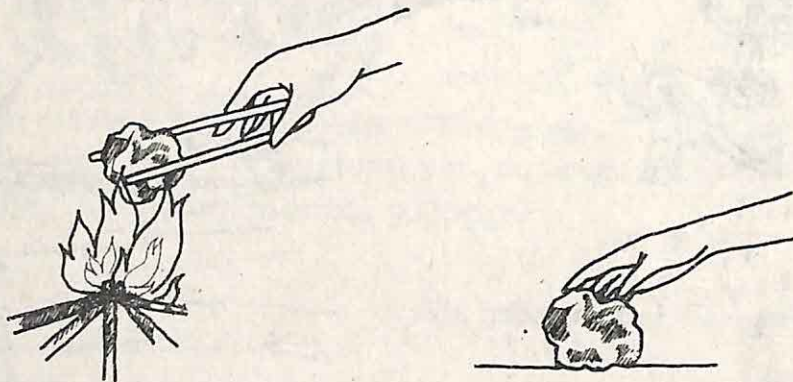


## Things to do

1. Do the following simple experiment to show that heat is absorbed quickly and given away quickly as radiations by solids.

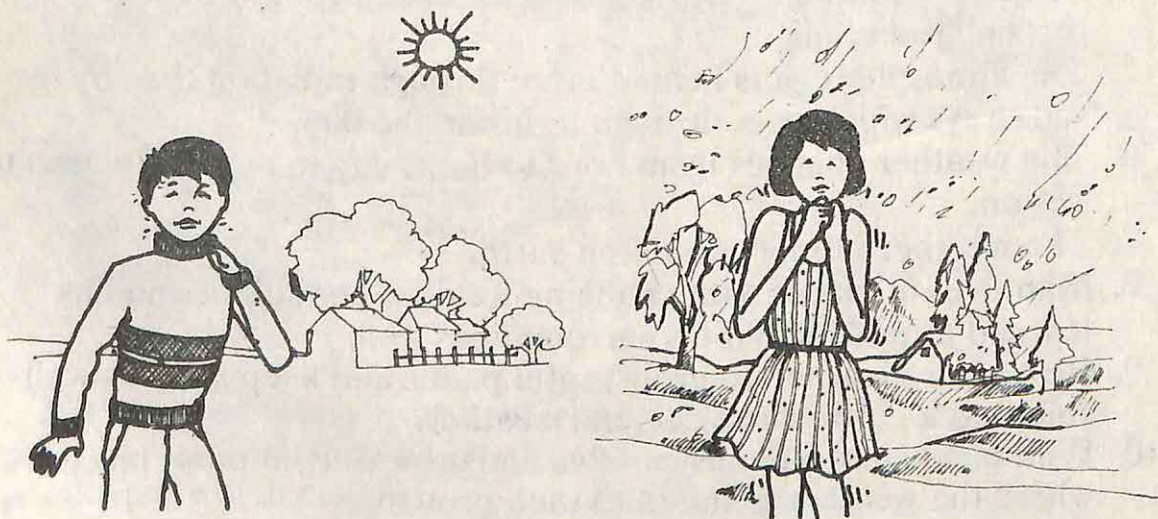
Take a stone and heat it in a fire for some time. It gets very hot.

Take it out of the fire and keep it on the floor. Touch it once in an hour. You will find it cooling gradually. It gets cold after a few hours.



The earth's surface gets heated by the sun in the same way and cools down gradually by radiating heat to the atmosphere that surrounds it.

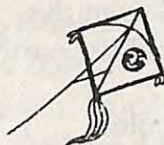
2. What clothes do you wear in summer, in the rainy season or in winter? You wear cotton clothes in summer and warm flannel or woollen clothes in winter. Wear a woollen sweater on a hot summer day. How do you feel? Will it not be too hot for you? Similarly, if you wear thin, cotton clothes in winter, you are sure to feel very cold and shiver.



3. In Class II, you marked in a chart whether a particular day was a sunny, windy, cloudy or rainy day. This you did for a week. Now mark the weather changes, using the following symbols, once in six hours (four times a day) for three days during the rainy season.

Symbols:

Windy



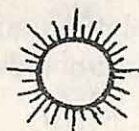
Cloudy



Rainy



Sunny



| Day       | 8 a.m. to<br>12.00<br>noon | 12 noon to<br>6 p.m. | 6 p.m. to<br>12.00<br>midnight | 12.00 midnight to<br>6 a.m. the next<br>morning |
|-----------|----------------------------|----------------------|--------------------------------|-------------------------------------------------|
| Monday    |                            |                      |                                |                                                 |
| Tuesday   |                            |                      |                                |                                                 |
| Wednesday |                            |                      |                                |                                                 |

### Exercises

- Answer briefly:
  - Name the things which determine the weather in a particular place.
  - How does the surface of the earth get heated and cooled?
  - Which is the hottest part of the day?
  - Why is the summer night warm?
  - Why is the winter night cold?
- Answer in detail:
  - Describe an experiment to show how the surface of the earth gets hot in the day time and gets cooled in the night.

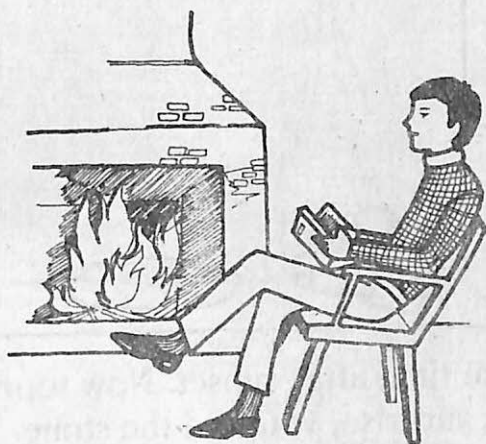


- b. Describe the influence of weather on man.
3. Fill in the blanks:
- The earth's surface gives away heat to the ..... that surrounds it only through .....
  - ..... is a combination of the sun's heat, wind, moisture in the air, clouds and rainfall in a particular place at a particular .....
  - During the day time, heat is received from the ..... faster than it ..... away from the surface of the earth.
  - During the night, heat continues to ..... away from the earth's surface and the ..... gets cooled.
  - There is not enough ..... of heat through radiation from the earth's surface in the night in .....
4. Tick the correct sentences. Correct the ones that are incorrect.
- The earth's surface does not store up the heat it receives from the sun.
  - In summer, the radiation is so rapid that the night becomes very chill.
  - Man uses suitable clothing for different weather conditions as he cannot understand weather changes.
  - Pine and eucalyptus grow well on cool mountain slopes.
  - Man cultivates plants and domesticates animals suitable to a particular place.
5. Tick the correct answer.
- The atmosphere gets (heated/cooled) through radiation.
  - The weather influences life on (the earth/the moon).
  - Wild plants and animals are found to grow (only in suitable climatic regions/anywhere in the world).
  - (Liquids/solids) get heated very quickly and get cooled in the same way.
  - (The atmosphere/the earth's surface) gets heated directly by the sun.

## 8. Land breeze and sea breeze

### What heats up the air, land and water?

You sit in front of a fire on a cold day. How do you feel? Don't you feel warm? Does the air between you and the fire get heated up in the same way? You will be surprised to know that the air between you and the fire remains much cooler. Let someone else stand between you and the fire. How do you feel now? You certainly feel much cooler now. The other person is now getting the heat from the fire. This is radiant heat or radiation.



*Sit in front of a fire on a cold day.*



*Let someone else stand between you and the fire.*

The surface of the earth consisting of land and water gets heated up in the same manner through radiation from the sun. The sun's radiations are absorbed or reflected by solids (land mass) and liquids (oceans, seas and lakes), but pass through gases (air) without actually heating them up. The air gets heated up only when it comes into contact with a warm land mass or warm water in the oceans, seas and lakes.

### Heat in land and water

If you happen to go to the seashore on a warm day, you will find the sand and the air above it quite warm. When you bathe in the sea



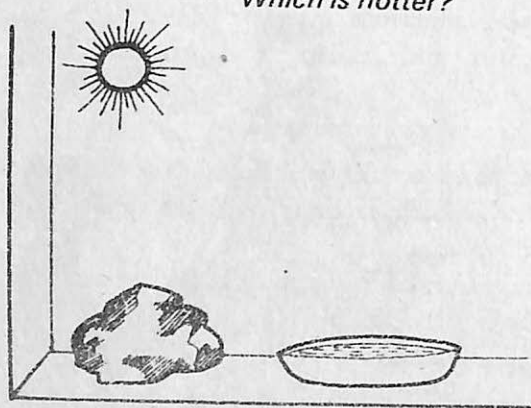
or merely stand on the shore with your legs immersed in water, you find it much cooler. Both the land and the sea have received the same amount of heat but their temperatures are different. Why?

The land mass gets heated quickly during the day and also gets cooled quickly in the evening. Water gets heated very slowly, during the day and takes a long time to cool down even after sunset.

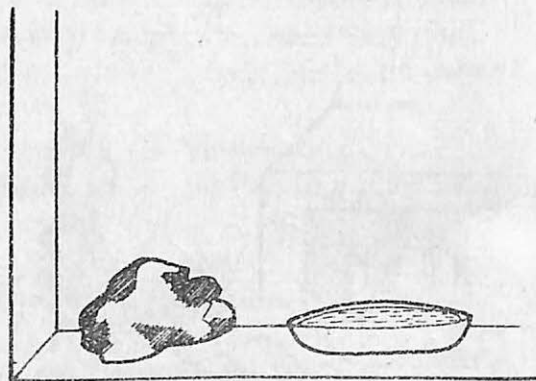
Here is an experiment to show this.

Take a stone and a cup of water. Keep them both in direct sunlight for a few hours. Then touch both of them. Which is hotter? The stone is very hot but the water is only a little warm.

*Which is hotter?*



*Which is cooler?*



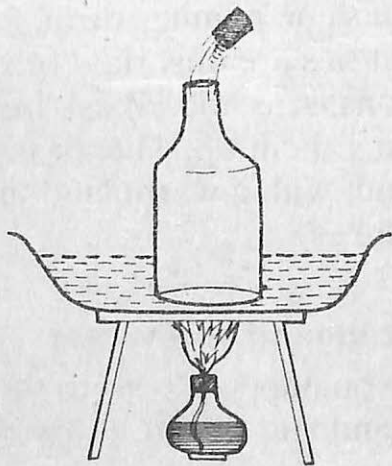
Keep them in the same place for some time after sunset. Now touch both of them. Which is cooler? To your surprise, you find the stone very cold whereas the water is still warm!

This explains how the land and the sea get heated by the sun and get cooled later on.

### **Air expands due to heat**

Take a bottle fitted with a tight cork and keep it in warm water. After some time, the cork is blown off. This is because air in the bottle expands due to heat and pushes the cork out.

*Air expands due to heat.*

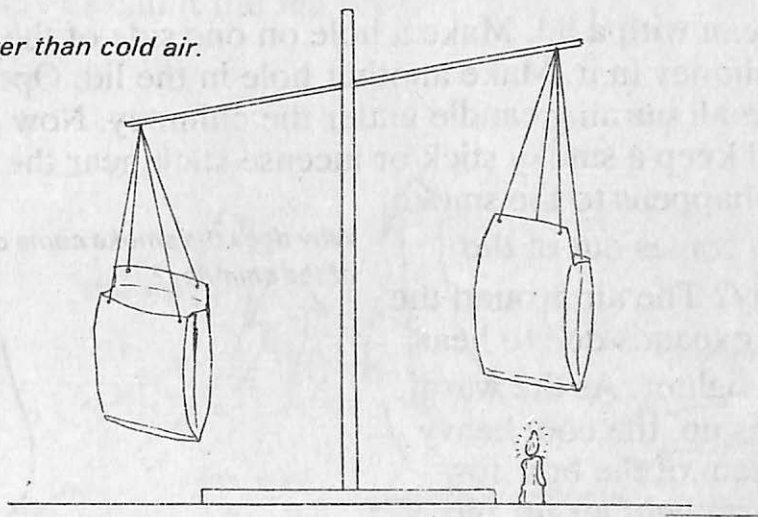


## Warm air is lighter than cold air

This can be easily shown by simple experiments.

1. Take a scale or a smooth stick and make a hole in its centre. Tie a thread to it. Then take two paper bags of the same size, inflate them and tie them up on either side of the stick as shown in the figure. Do not tie them air-tight. Hang the stick from a wooden stand. Keep a burning candle under one of the bags in such a way that the bag does not catch fire. See what happens after some time.

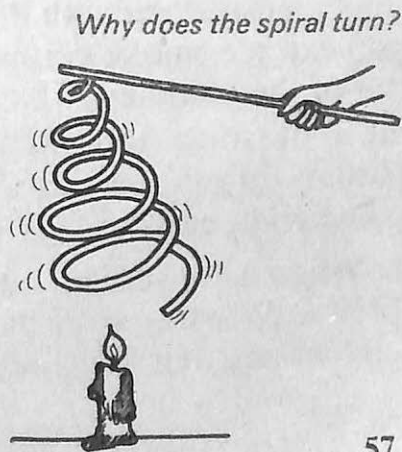
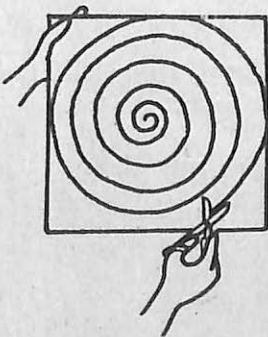
*Warm air is lighter than cold air.*



The warmed-up paper bag goes up and the cold one stays down.

The air within the bag has been warmed by the heat of the candle flame. As it expands and gets lighter due to warming, it rises up. Cold air, being heavier, comes down.

*Cut a paper spiral.*





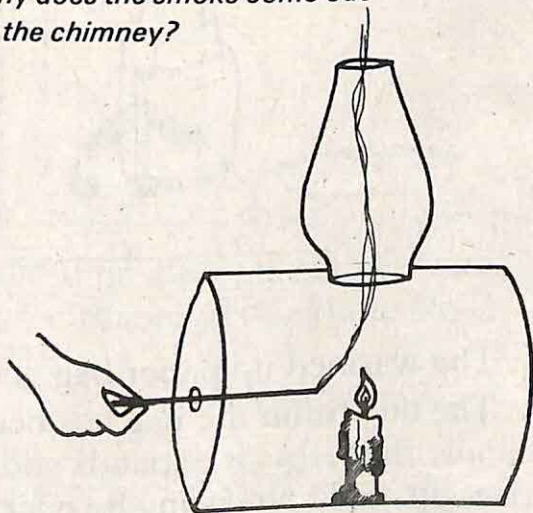
2. Take a thin piece of paper and draw a spiral on it. Then cut the paper along the spiral line. Tie the centre of the paper spiral to a long stick. Light a candle and place the paper spiral a little above the flame as shown in the figure. You can see the paper spiral turning round and round. What makes it turn that way? It is the warm air above the flame that gets lighter and so rises up through the paper spiral. As it rises, it turns the spiral.

### How are air currents formed?

Take a tin can with a lid. Make a hole on one side of the tin and fix a tall glass chimney in it. Make another hole in the lid. Open the lid and place a small burning candle under the chimney. Now close the lid tightly and keep a smoky stick or incense stick near the hole in the lid. See what happens to the smoke.

The smoke comes out of the chimney. Why? The air around the candle flame expands due to heat and becomes lighter. As the warm, lighter air rises up, the cool heavy air at the bottom of the box now pushes the warm light air up and occupies its space. As this air gets warm and rises up, more cool air from outside enters the tin can through the hole in the lid. This carries the smoke from the stick or the incense along with it. Therefore you can see smoke coming steadily out of the chimney. The cooler, heavier air chases the warmer, lighter air to move up, thus creating an air current. The smoke shows the path of the air current. Currents of air caused in this way are called convection currents.

*Why does the smoke come out of the chimney?*

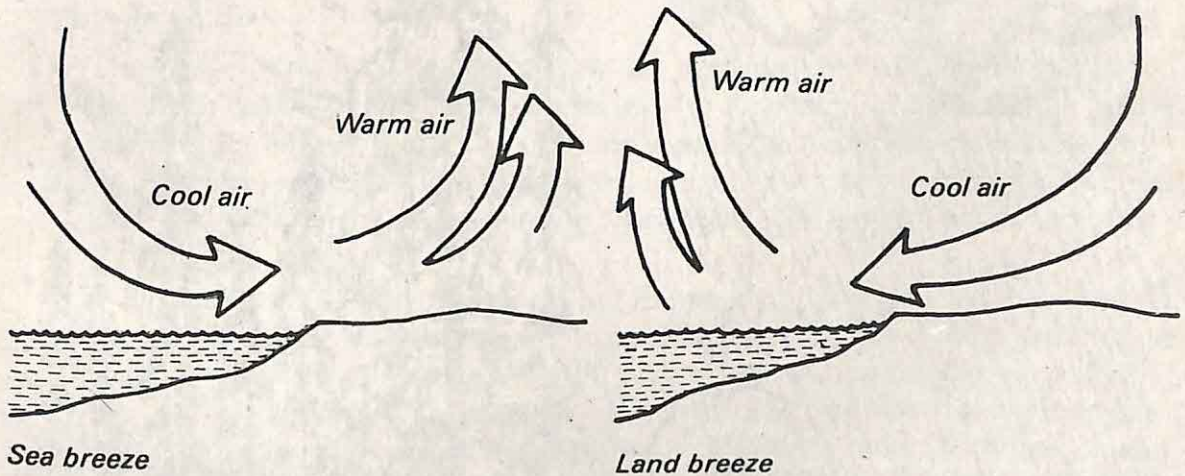


When a convection current takes place slowly, we get a gentle breeze. When it takes place rapidly, we can feel the air moving faster and we say that the wind is blowing.



## Sea breeze

On a hot summer day, the land becomes hotter than the sea water. The air over the land becomes warmer than the air over the water. The warm air over the land expands, becomes lighter and moves up. The cool air from above the sea, which is heavier, now moves towards the land and pushes the warm air further up and occupies its space. Thus there is a steady current of cool air blowing from the sea towards the land. This is called a sea breeze. We get cool sea breeze during the day time. When the wind blows from the surface of the sea towards the land, we call it the sea breeze.



## Land breeze

After sunset, the land loses its heat more rapidly than the sea water. As the warm air over the sea expands and rises up, cooler air from the land flows under it and occupies its space. Thus there is a steady current of cool air blowing from the land towards the sea. This is called a land breeze. We experience land breeze in the night time. When the wind blows from the surface of the land towards the sea, we call it the land breeze.

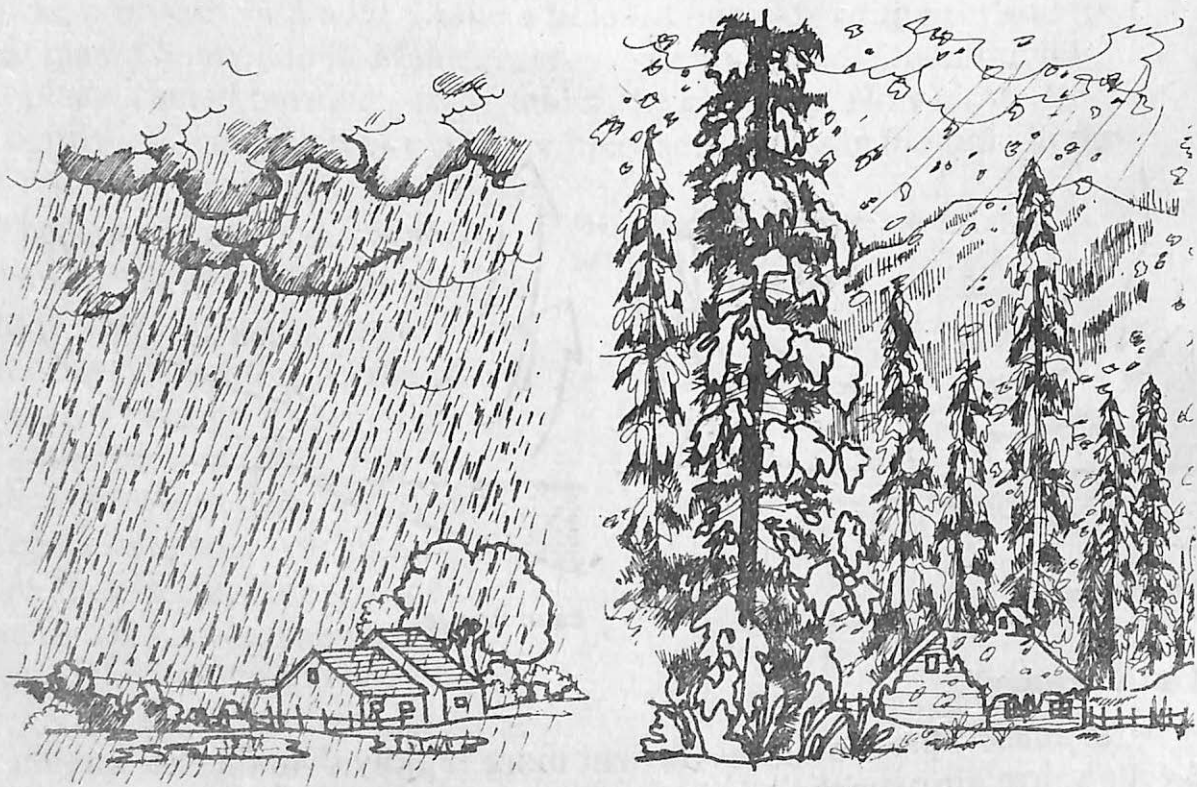
People who live near a lake also experience lake breeze and land breeze caused by convection currents.



In summer, unless the sea breeze sets in quickly during the day time, people experience very hot, sultry weather.

### **Influence of wind currents**

The wind plays an important role in determining the weather in a particular place. As the wind blows from the sea to the land, it carries water vapour along with it. Thus it brings rainfall. If it is a very cold region, then the wind brings snowfall. It is also the wind that brings storms and sometimes takes them away!



*The wind brings rainfall and snowfall.*

### **Things to remember**

1. The surface of the earth gets heated by the sun through radiation.
2. The sun's radiation is absorbed or reflected by solids and liquids but passes through gases without actually heating them up.
3. Solids (land masses) get heated quickly and lose heat in the same way.

4. Liquids (water) take a long time to get heated, but retain the heat for a long time too.
5. Air expands when heated.
6. Warm air expands and rises up as it is light. Cool air, which is heavier, occupies its place and pushes it further up. This causes air currents.
7. Currents of air caused in this way are called convection currents.
8. Sea breeze and land breeze are caused by convection currents.
9. Wind currents bring rain or snow. They bring storms or take them away.
10. Wind currents influence the weather in a particular place.

### Things to do

1. There is another way of showing how air expands due to heat. Instead of fixing a cork to the bottle, you can fix a balloon to its neck and immerse the bottle in warm water as you did before. The air expands and inflates the balloon.
2. You may have seen some people pouring a lot of water on the verandah outside their bedroom on summer evenings. Have you ever thought about the reason for it?

Do this yourself one evening. What happens to the water that you pour on the verandah? You can see that it evaporates very quickly. What is the reason for this? The verandah receives a lot of sunshine during the day time and it gets heated. If it is left dry, then the air above it will be warm and the wind that comes into the bedroom will also be warm. If the verandah is cooled down by pouring water, then we can get cool breeze in the night and we can sleep well.

3. Visit a lake shore or seashore during the day time to feel the cool sea breeze. Stay there if possible till late in the evening. You will now get the land breeze.

### Exercises

1. Answer briefly:
  - a. What happens to air when it is heated?
  - b. How are wind currents formed?
  - c. What are sea breeze and land breeze?
  - d. Describe a simple experiment to show that air expands when heated.
  - e. Why is sea water warm even after sunset?
  - f. You are not able to sit on a sandy beach in the afternoon, but you go there to spend your time in the evening. How is this possible?



2. Answer in detail:
  - a. Describe how sea breeze and land breeze occur.
  - b. Describe an experiment to show that warm air rises up. Draw a neat diagram to illustrate the experiment.
  - c. Show by means of an experiment how convection currents take place. Draw a suitable, labelled diagram.
3. Fill in the blanks:
  - a. Wind currents bring in ..... or ..... fall.
  - b. Wind currents influence the ..... in a particular place.
  - c. When ..... current takes place slowly, we get a gentle .....
  - d. People who live on the shore of a lake experience ..... in the day time.
  - e. During the day time, the land gets heated ..... than the ..... in the sea.
4. Who am I?
  - a. I expand and rise up when heated.
  - b. I absorb heat slowly but I retain it for a long time.
  - c. I bring storms and sometimes take them away.
  - d. I blow from the land to the sea in the night time.
  - e. I do not permit people to walk on me barefoot on a hot afternoon.



## 9. Water and its impurities

### Sources of water

When we wake up in the morning, we need water to clean ourselves. This water is one of the commonest things that we find around us, the other two being the air and the soil. Water fills ponds, lakes, rivers, seas and oceans. You have learnt about the water cycle and how water that evaporates from these sources to form clouds are brought back to them as rain.

*Water is one of the commonest things we find around us.*



Just because water is one of the commonest things we find around us, we rarely think what life would be like without water! Water is so important that without it life would be impossible. Water forms part of any living thing — plants, animals, human beings or the very minute living things which we can see only through a microscope. This water, which is needed in plenty, should also be clean.

### Impurities in water

Water dissolves many substances in it. You can understand this by doing the following experiment.

Put some salt in a cup of water and stir it well. Where does the



salt go? How could it disappear so soon? Taste a drop of this water. It tastes salty! Now you know that the salt which has disappeared has really dissolved in water to form a salt solution. A liquid which has something dissolved in it is called a solution.



*Make a salt solution and a sugar solution.*

Similarly you can make a sugar solution by dissolving sugar in water. If the salt solution tastes salty, what would the taste of the sugar solution be?

Many unwanted things can also dissolve in water and make it impure. Such water is said to have dissolved impurities.

Water is also made impure when substances such as leaves, dry flowers, paper and even dead animals and plants fall into it and

remain in it. They do not dissolve in water.

Impurities which do not dissolve in water are called suspended impurities.

During the rainy season, apart from the above mentioned suspended impurities, even particles of soil are washed away by streams and rivers from mountains and plains. So water in these rivers looks muddy during the rainy season. So also, water in lakes and ponds becomes muddy when rain water flows into them from the land.

Soon after the rain stops, you find water becoming clearer in rivers, ponds and lakes. How is this possible?

## **Sedimentation**

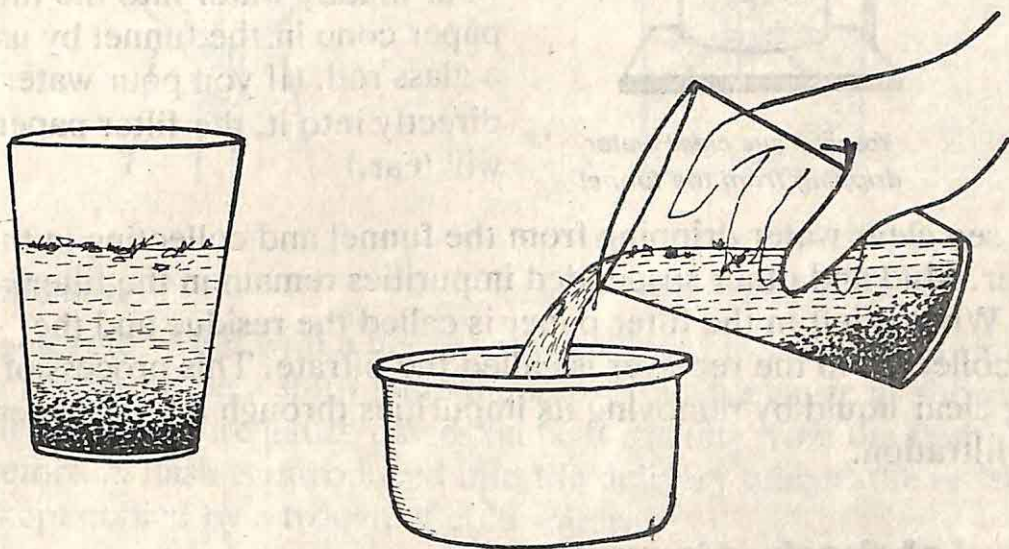
Take a tumbler of muddy water and examine it against sunlight. You see tiny particles of mud suspended in it. Leave it undisturbed. See what has happened to it after a few hours. When you examine it against sunlight, you can see very clearly that the particles of mud



have settled down and clear water remains on top. Sometimes you might find dry twigs or bits of leaves floating on the water too. Why is this?

The heavier particles settle down at the bottom of the tumbler as sediment and the lighter ones float on top. Both kinds are called suspended impurities.

*The heavier particles settle down at the bottom and the clear water can be poured off.*



## **Decantation**

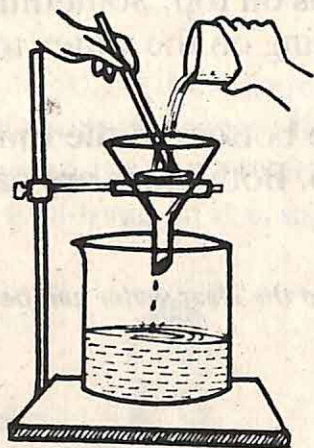
As you saw just now, the heavier particles can be made to settle down as sedimentation. The clear water can then be poured off into another vessel. This method of separating the heavy, suspended impurities from water is called sedimentation and decantation. This is a rough and a rapid process.

## **Filtration**

At home, when we want to remove floating impurities from water (light, suspended impurities), we use a thin, clean cloth to filter them out. This is a crude process of filtration.

Filtration is a sure way of removing any kind of suspended impurities from water.





*You can see clear water dripping from the funnel.*

Take a funnel stand and fix a glass funnel in it. Take a circular filter paper and fold twice to make it into a cone as shown in the figure. Fix it into the funnel with a drop of water. Keep a beaker under the funnel as a receiver. Pour muddy water into the filter paper cone in the funnel by using a glass rod. (If you pour water directly into it, the filter paper will tear.)

You see clear water dripping from the funnel and collecting in the receiver. Mud and other suspended impurities remain in the filter paper. What is left in the filter paper is called the residue and the liquid collected in the receiver is called the filtrate. This process of getting clear liquid by removing its impurities through a filter paper is called filtration.

### **Removal of dissolved impurities**

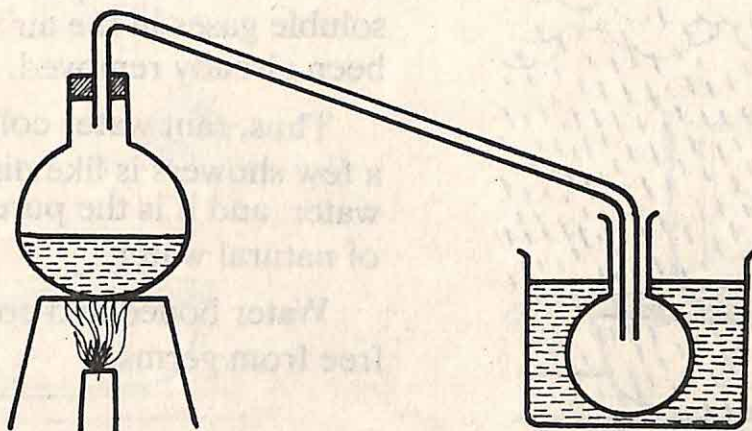
Take the salt or the sugar solution you had prepared earlier and pour it into a porcelain vessel, a china dish. Evaporate the water by placing the dish in sunlight. What is left in the china dish? You will find a white deposit at the bottom of it. This will be either salt or sugar from the solution you had taken. What has happened to the water in the solution? It has changed into its vapour form. This process of change of a liquid into its vapour is called evaporation.

*The water changes into its vapour, leaving the salt or sugar in the dish.*





*Distilled water is the purest sample of water.*



## **Distillation**

A retort (a vessel with a neck) with the liquid to be purified (muddy water) is placed on a spirit lamp flame over a wire gauze as shown in the figure. The wire gauze passes on heat steadily from the flame into the retort. A flask is introduced into the delivery tube as the receiver. It is kept cooled by a trough of cold water.

As the liquid (water) gets heated, it evaporates and passes through the delivery tube and reaches the other flask, kept as a receiver. As this flask is cooled by a trough of water, water vapour from the retort gets condensed as water and collects in the receiver. Water thus collected does not contain any dissolved or suspended impurities.

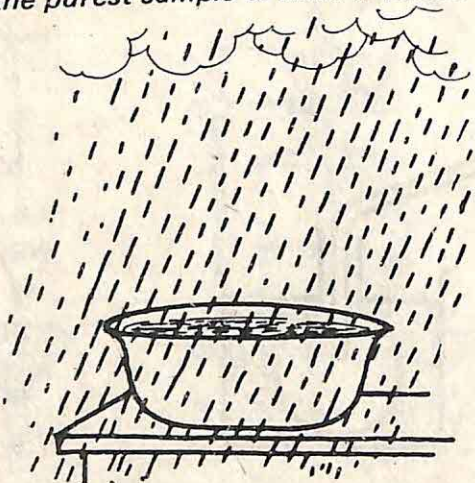
This process of collecting pure liquid through vapourisation and condensation is called distillation. This water is called distilled water. It is the purest sample of water.

## **The purest sample of natural water**

We get rain through evaporation and condensation. But rain water gets mixed up with impurities in the air and in the soil. If we collect rain water in a wide-mouthed bottle by placing it in the centre of a terrace, after a few showers, we can get the purest sample of natural water. It will be crystal clear and on evaporation will not leave any



*Rain water collected after a few showers is the purest sample of natural water.*



residue. As it is collected after a few showers, dust particles and soluble gases in the air would have been already removed.

Thus, rain water collected after a few showers is like distilled water and it is the purest sample of natural water.

Water boiled and cooled is also free from germs.

### **Factors that affect evaporation**

Evaporation takes place quickly or slowly according to the pressure of the wind, the temperature, the exposed surface area and the dryness or humidity of the air.

Do the following experiments to understand these factors clearly.

1. Take equal quantities of water in two broad vessels of the same capacity and shape. Place one of them under a fan and another in a closed room. Look at them after a few hours. Which of them has less water?

The vessel kept under the fan has very little water left and the other has lost very little water. This shows that water evaporated quickly due to the breeze produced by the fan. The other vessel received hardly any breeze and therefore very little evaporation took place.

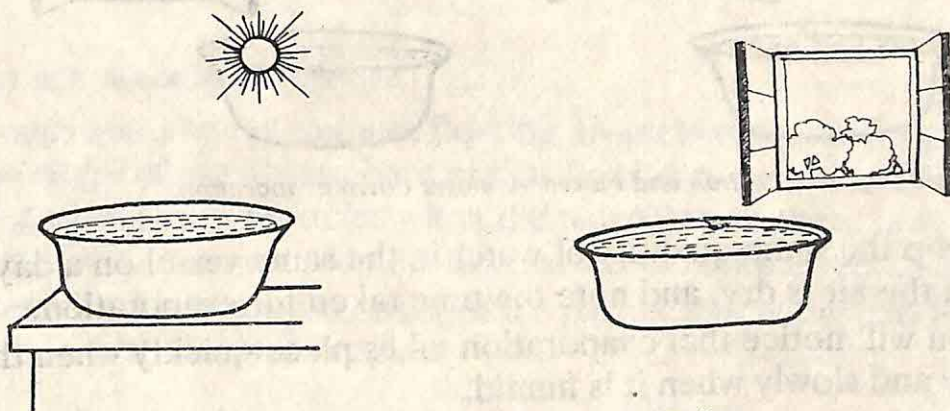
Wind speeds up evaporation.

*Wind speeds up evaporation.*





2. Take the same quantity of water in both the vessels once again and place one of them under direct sunlight and the other in the shade. See what happens.



*Heat or warmth speeds up evaporation.*

Water kept under the sun evaporates quickly whereas water kept in the shade takes a lot of time to evaporate. This is because the sun's heat helps evaporation.

Heat or warmth speeds up evaporation.

3. Take equal quantities of water in a broad vessel and a narrow vessel. Keep them in the same place and see what happens.

Water in the broad vessel evaporates quickly whereas evaporation takes place at a very slow rate in the narrow vessel.

*Greater surface area exposed speeds up evaporation.*

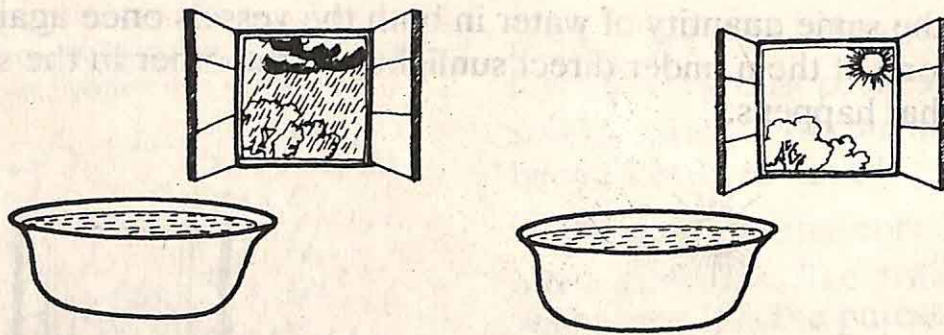


Evaporation normally takes place only from the surface of the liquid. Therefore, the broader vessel which has a greater surface area exposed, causes water to evaporate faster. The vessel with less surface area exposed allows very little water to evaporate.

Greater surface area exposed speeds up evaporation.

4. Keep a certain quantity of water in a vessel and find out how long it takes to evaporate on a rainy day.





*Dry air speeds up evaporation and humid air slows down evaporation.*

Keep the same quantity of water in the same vessel on a day when the air is dry, and note the time taken for evaporation.

You will notice that evaporation takes place quickly when the air is dry and slowly when it is humid.

Dry air speeds up evaporation and humid air slows down evaporation.

### **What is precipitation?**

Now that you have learnt about evaporation and condensation, you can understand what is meant by precipitation.

Precipitation is a common name given to all forms of moisture which gets deposited or condensed on the earth from the atmosphere like dew, rain, snow, sleet and hail.

### **How does it rain?**

Mostly, water droplets found in a cloud are so minute that they cannot fall down as rain. This is the reason why all clouds do not produce rain or precipitation. To produce rain, the droplets of water in the cloud must somehow join and become a water drop big enough to become a rain drop.

When a cloud goes very high, it becomes so cold due to lack of heat in the air that it produces ice particles as well as highly cooled water droplets. They dash against each other and join together to form bigger particles. Since they are heavy, they cannot stay at such a great height. So they turn into snow flakes and begin to fall. If the surface



of the earth and the air above it are very cool, they fall as snow. If the surface of the earth and the air above it are warm enough to melt the snow, then they reach the earth as rain. The black rain clouds bring us rain

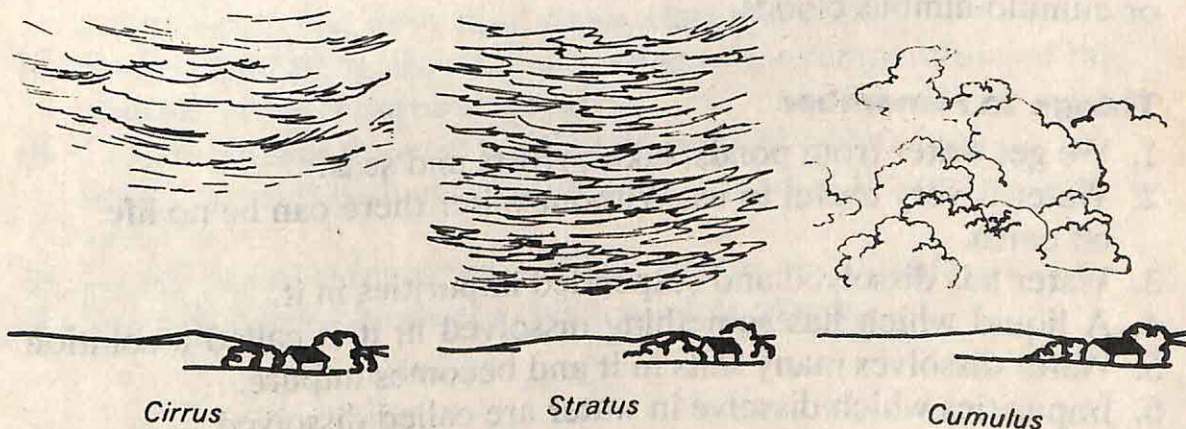
### **What are clouds made of?**

Clouds are made of minute, floating droplets of water if the temperature of the atmosphere at that level is not very low. They consist of small ice particles when the temperature there is very low. Millions of such water droplets are needed to make a rain drop.

Normally, high clouds consist of ice particles or snow and low clouds consist of water droplets.

### **Types of clouds**

You have seen various cloud formations whether it is the rainy season or not. It will be interesting to know the different formations and types of cloud. There are three major cloud forms. They are cirrus, stratus and cumulus clouds.



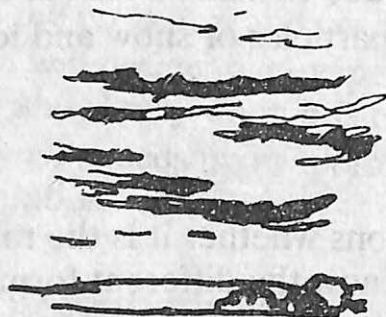
*There are three major cloud forms.*

1. Cirrus clouds are high clouds made of ice crystals. They have a thin, streaky, feathery appearance. They travel very fast. (Cirrus means hair or a curl.)

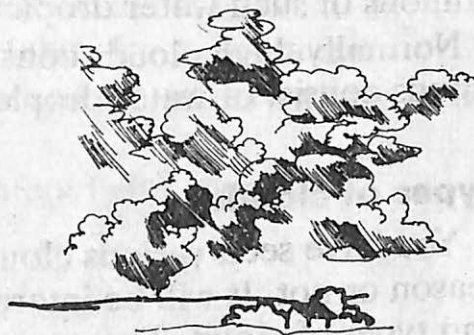


2. Stratus clouds are very low clouds with a grey colour and no definite form. They move across the sky like giant sheets in layers. Sometimes we get a drizzle from these clouds. (Stratus means layer.)
3. Cumulus clouds are low clouds, but are found a little higher than the stratus clouds. They have flat bottoms with lumps on top. The lumps look like those of a cauliflower. (Cumulus means a lump or a heap.)

*Nimbo-stratus*



*Cumulo-nimbus*



*Nimbus clouds are black rain clouds.*

Nimbus clouds are black rain clouds. They can be nimbo-stratus or cumulo-nimbus clouds.

### **Things to remember**

1. We get water from ponds, lakes, rivers and seas.
2. Water is very useful to us. Without water there can be no life on earth.
3. Water has dissolved and suspended impurities in it.
4. A liquid which has something dissolved in it is called a solution
5. Water dissolves many salts in it and becomes impure.
6. Impurities which dissolve in water are called dissolved impurities.
7. Impurities which remain undissolved or suspended in water are called suspended impurities.
8. The method by which heavier suspended impurities in water are

- made to form a sediment and are then removed is called sedimentation and decantation. This is a rough and a rapid process.
9. Filtration is a sure way of removing any kind of suspended impurity in water.
  10. The undissolved part left in the filter paper is called the residue and the clear liquid collected through filtration in the receiver is called the filtrate.
  11. We get back the dissolved substances from a solution through evaporation.
  12. We get the purest sample of liquid through distillation.
  13. A process of vapourisation and condensation of a liquid is called distillation.
  14. Distilled water is very pure.
  15. The purest sample of natural water is rain water collected after a few showers.
  16. Evaporation takes place quickly or slowly according to the presence of wind, the temperature, the exposed surface area, dryness or humidity in the air.
  17. Precipitation is a common name given to all forms of moisture, which gets deposited or condensed on the earth from the atmosphere, like dew, rain, snow, sleet and hail.
  18. We get rainfall or snowfall according to the temperature of the atmosphere in a particular region.
  19. Clouds contain minute, floating droplets of water if the temperature is high and minute ice particles if the temperature is very low.
  20. Clouds are of three types — cirrus, stratus and cumulus.
  21. The black rain clouds are called nimbus clouds.

### **Things to do**

1. Watch clouds of various types and find out whether you can identify them.
2. Collect pictures showing various cloud formations for your class display board.
3. Watch the sky just before it begins to rain. Watch it soon after it stops raining. The dull gloomy sky with nimbus clouds becomes clear and bright soon after it stops raining.



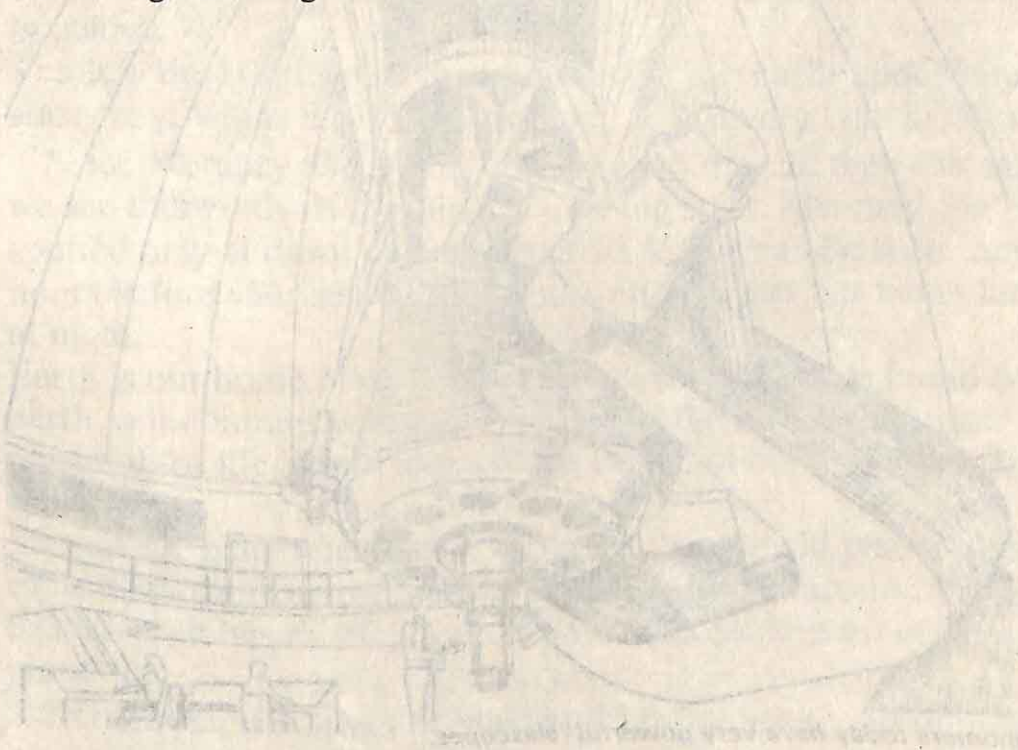
4. Find out how long it takes to dry your handkerchief on a rainy day, a cloudy day, windy day and a sunny day. Record your findings in the table given below. Use different clothes for your experiment and record your findings.

| Type of Clothes | Time taken for drying |            |           |           |
|-----------------|-----------------------|------------|-----------|-----------|
|                 | Rainy day             | Cloudy day | Windy day | Sunny day |
|                 | m. sec.               | m. sec.    | m. sec.   | m. sec.   |
| Handkerchief    |                       |            |           |           |
| Cotton shirt    |                       |            |           |           |
| Cotton frock    |                       |            |           |           |
| Nylon shirt     |                       |            |           |           |
| Woollen socks   |                       |            |           |           |

### Exercises

- Answer briefly:
  - What are the three types of clouds? What do each of them mean?
  - What is precipitation?
  - What are the various forms of precipitation?
  - Name the various factors which affect evaporation.
  - What is sedimentation and decantation?
  - What is filtration?
  - What is distillation?
  - Which is the purest sample of natural water?
  - Name the types of impurities found in water.
  - What is a solution?
  - Which clouds bring us rain?
- Answer in detail:
  - If you bring a bucket of muddy water from a pond or a river, how can you get clear water from it?
  - What are filtrate and residue? Describe the process of filtration.
  - If you want to get the purest sample of a liquid, what method will you adopt? Describe it.
  - If you want to get back salt from its solution, what will you do?
  - Describe where the three types of clouds occur and what they look like.
  - How does it rain?
- Tick the correct answer.
  - We get the purest sample of a liquid through
    - evaporation;
    - distillation;
    - filtration.

- b. This cloud is found very low in several layers.
    - i. cumulus; ii. cirrus; iii. stratus.
  - c. Clothes dry quickly when the air is
    - i. dry; ii. humid; iii. cool.
  - d. We get snowfall
    - i. when the atmosphere is warm;
    - ii. when the atmosphere is very cold;
    - iii. when the surface of the earth is hot.
  - e. Evaporation takes place very quickly when
    - i. water is kept in a saucer;
    - ii. water is kept in a tumbler;
    - iii. water is kept in a bottle.
4. Find the odd one out in each group and give reasons for your choice.
- a. rain, hail, sleet, dust
  - b. stratus, snow, cumulus, cirrus
  - c. dry air, wind, cloud, warm air
  - d. precipitation, distillation, filtration, decantation
  - e. leaf, twig, salt, a log of wood

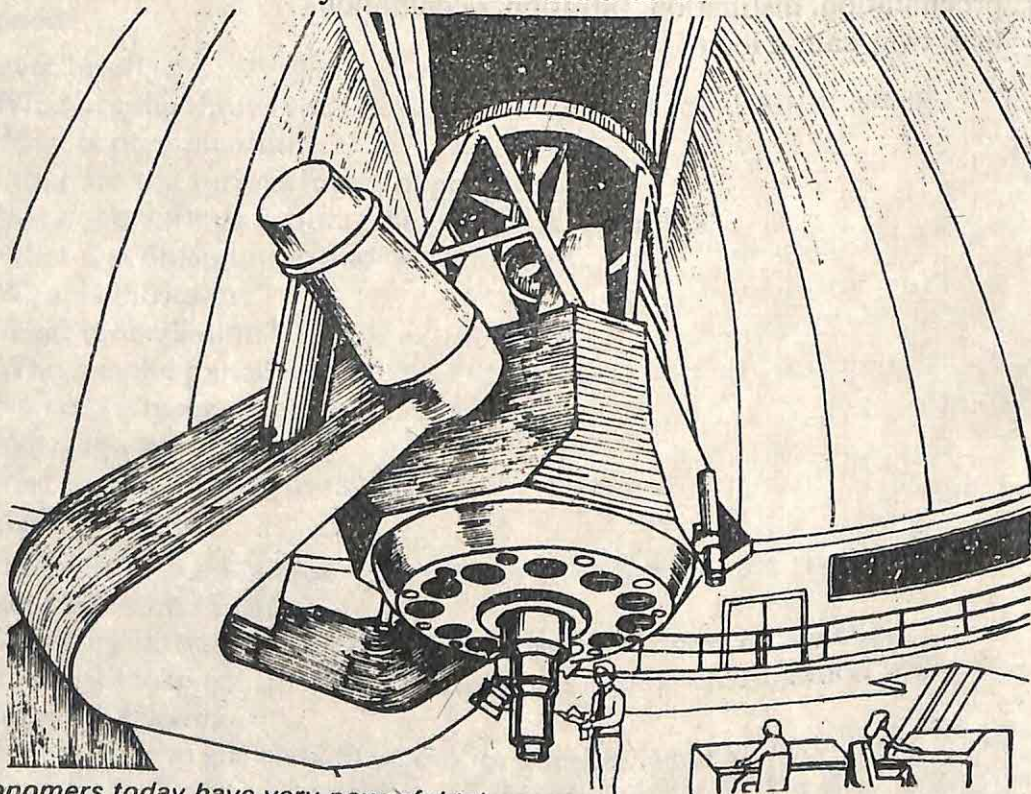




## 10. The earth and its seasons

Ancient man looked at the twinkling stars and the blinking planets with awe. Slowly, he learned to observe and understand them. Just as he observed the sunrise in the east and the sunset in the west, he realised that the moon, the stars and the planets also had their own times of rising in the eastern sky and setting in the western sky and at different seasons of the earth.

The early astronomers had crude telescopes with which they observed these heavenly bodies and tried to understand them better.



*Astronomers today have very powerful telescopes.*

Astronomers of today have very powerful telescopes with which they tell us more about them. Scientists have sent several space-ships to the moon, and to some of the planets to learn more about them.



## **What are planets?**

A planet means a wanderer. Planets are heavenly bodies which travel round the sun in definite paths of their own. The definite path of a planet through which it travels round the sun is called its orbit. Planets are members of the sun's family. The sun and its family of planets and their moons form the solar system. We know a lot about these planets. But the best known planet is the one that belongs to us, the earth.

## **Some interesting facts about each planet**

You are quite familiar with the planets in the solar system. Would you like to know certain interesting facts about each of them?

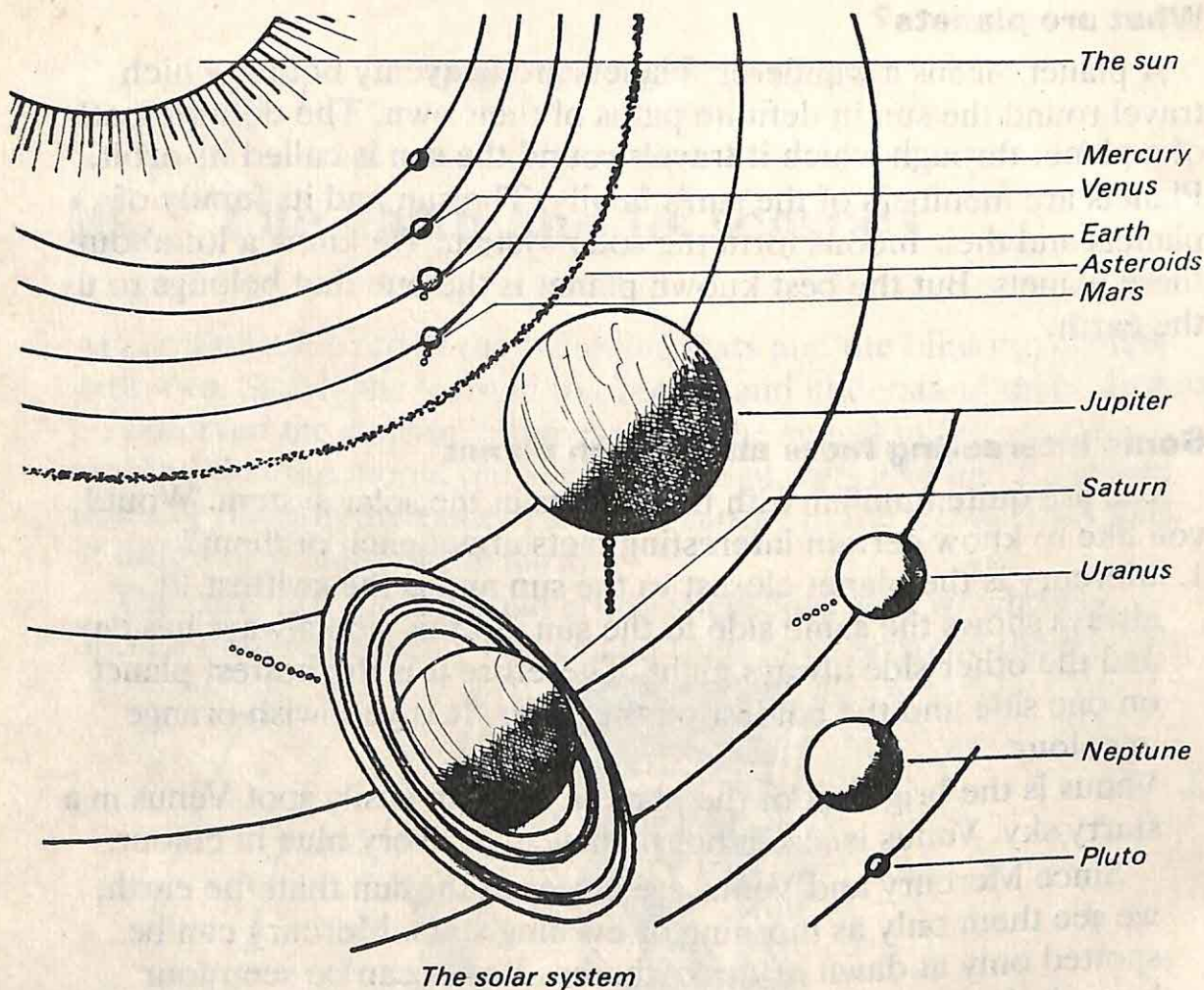
1. Mercury is the planet closest to the sun and is the swiftest. It always shows the same side to the sun. So this side always has day and the other side always night. Therefore it is the hottest planet on one side and the coldest on the other. It is yellowish-orange in colour.
2. Venus is the brightest of the planets. We can easily spot Venus in a starry sky. Venus is also a hot planet. It is silvery blue in colour.

Since Mercury and Venus are closer to the sun than the earth, we see them only as morning or evening stars. Mercury can be spotted only at dawn or dusk whereas Venus can be seen four hours before sunrise and four hours after sunset but never late at night.

3. Earth is our home planet. We now believe that life is found only on earth as it contains water and oxygen in the air—two things essential for life. Earth looks like a beautiful blue, lighted ball from the moon.
4. Mars is the planet nearest to the earth. It is a cold planet because of its distance from the sun. Eventhough the air around this planet has water, it has no life. Mars has two moons. It is an orange-red planet.

In between the orbits of Mars and Jupiter are found innumerable asteroids or planetoids. They are too small to be called planets. They also travel round the sun in their own orbits.





5. Jupiter is the biggest planet of the solar system. It is so cold that it is known as the icy giant of the sky. It has twelve moons. It is a bright planet and only Venus is brighter than Jupiter.
6. Saturn is a very cold planet with rings around it. It is also a huge planet and looks bright due to its size even though it is very far from the earth. Until recently, Saturn was thought to have nine moons. A tenth moon has since been discovered.
7. & 8. Uranus and Neptune are called the green giants because of their enormous size. They appear green when seen through a telescope. Uranus is bigger than Neptune. Both of them are very cold planets. Uranus has five moons whereas Neptune has none.
9. Pluto is the farthest and the coldest planet. It is very small, like



Mercury. This planet was discovered only very recently, in the year 1931!

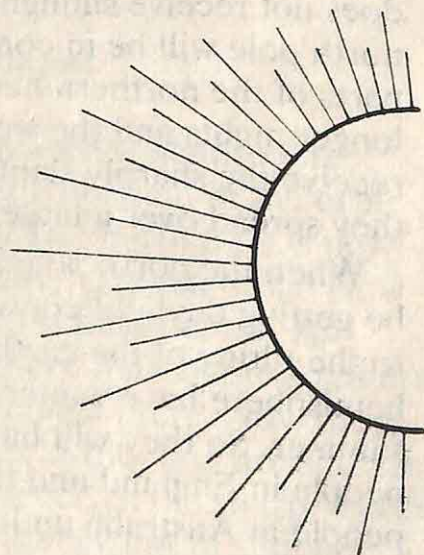
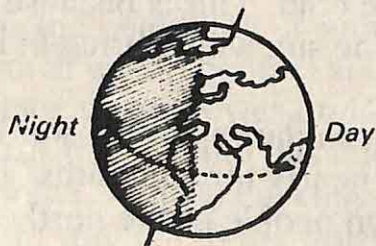
### **The earth's gravity**

The earth is a huge sphere which has a pulling force called gravity. Any substance that is thrown away from the earth is pulled back to its surface, by its gravitational force. Space-ships and rockets are sent into outer space at great speed so that they escape the force of gravity!

### **Rotation of the earth**

One full turn of the earth is called rotation. This takes twenty-four hours. Rotation of the earth causes day and night.

The sun always shines but, at any time, only one half of the earth receives sunlight and the other half is turned away from it. The part that faces the sun experiences day time and the other part, being in the earth's own shadow, has night. When our part of the earth gets day time, the other part experiences night time. We get day and night repeatedly due to the rotation of the earth. We do not feel the rotation as it takes place at a steady rate without stops or starts. The earth turns from west to east, which is why we feel that the sun is travelling in the opposite direction, from east to west.



*Rotation of the earth causes day and night.*



## **Revolution of the earth**

Do you know that you are making an yearly journey round the sun? You travel on the spinning earth as it continues its never-ending journey round the sun. It takes one year, or approximately 365 days, for the earth to complete its journey round the sun on a definite path, its orbit. This is called the earth's revolution.

The earth's orbit is an elliptical path. We will be closer to the sun at some periods of the year and a little away from it at some other periods. Apart from this fact, the earth is tilted while it circles the sun. Its axis is never vertically upright but always at the same slant to its orbit. This causes the seasons.

We get cold winters and hot summers only due to the tilting of the earth and its revolution in an elliptical orbit.

## **The seasons**

There are four seasons — spring, summer, autumn and winter.

December 22 is the beginning of winter, in the northern part of the world, the part above the equator. This we call the northern hemisphere and the part below the equator, the southern hemisphere.

The equator is an imaginary line that runs across the middle of the earth dividing it into two equal parts.

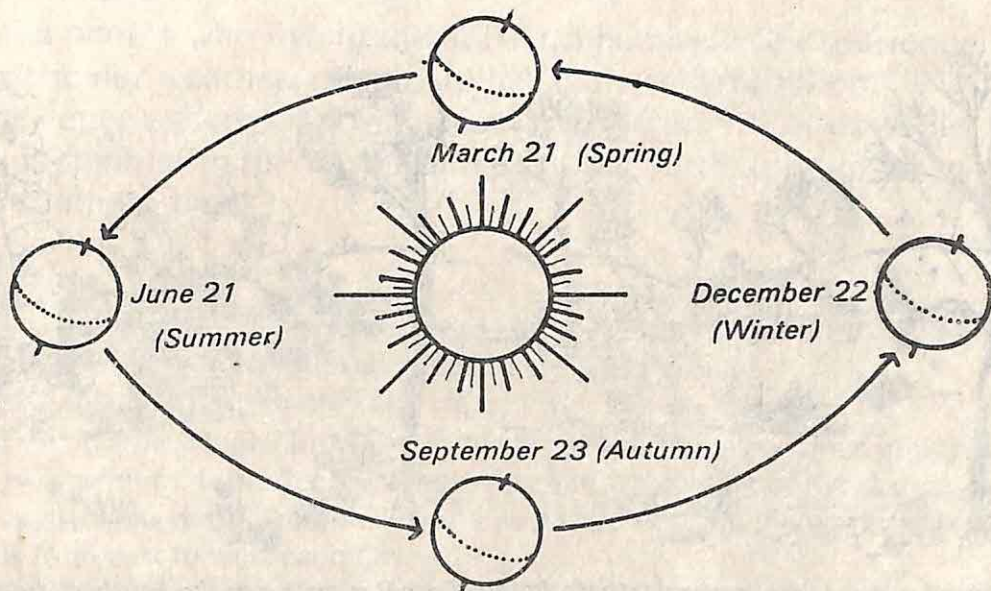
During winter, the north pole is pointed away from the sun. So it does not receive sunlight throughout winter, until March 20. The north pole will be in complete darkness during this period. The other parts of the northern hemisphere will be having shorter days and longer nights and the weather will be cold. This is because they receive the sharply slanting rays of the sun which bring in less heat as they spread over a large area.

When the north pole is completely in darkness, the south pole will be getting daylight continuously for nearly three months. This is due to the tilting of the earth's axis. When people of the northern hemisphere have winter, the people of the southern hemisphere have summer. So they will have longer days and shorter nights. When people in England and the United States celebrate a cold Christmas, people in Australia and New Zealand celebrate a sunny Christmas!



March 21 is the first day of spring, in the northern hemisphere. At this time, the earth would have moved further along its orbit so that both the poles receive sunlight.

When it is spring for people in the northern hemisphere, it is autumn or fall in the southern hemisphere. It is less cold than winter and less warm than summer because the earth receives less sharply slanting rays from the sun that spreads over a lesser area, bringing in more heat. The day and night will be of equal duration, 12 hours each, as both the poles receive sunlight.



*Seasons in the northern hemisphere.*

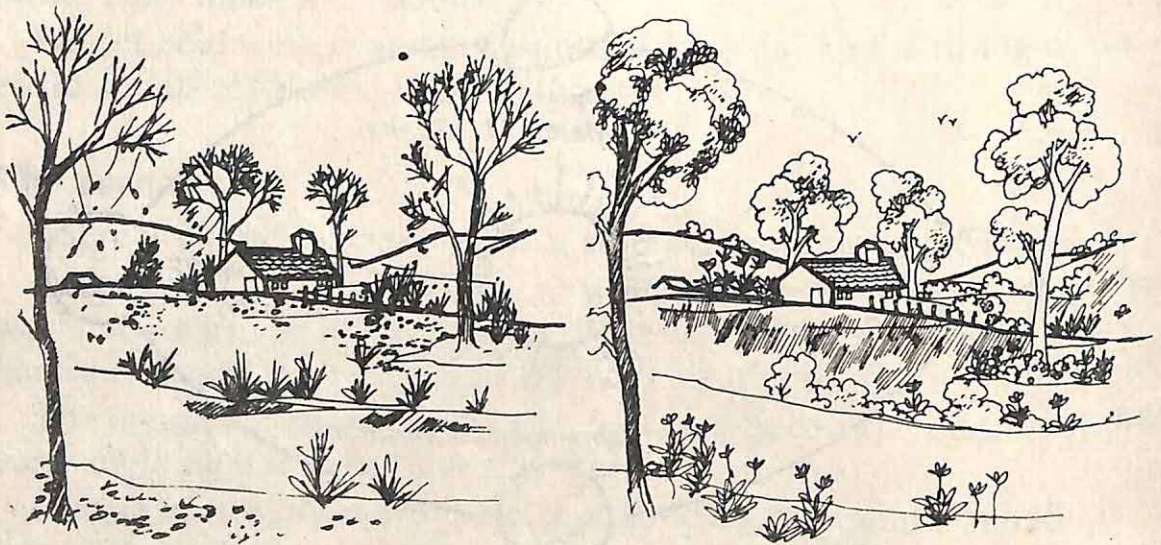
June 21 is the beginning of summer in the northern hemisphere, when the earth would be in exactly the opposite position in the orbit from the place where it was on December 22. The north pole is now tilted towards the sun and has daytime for nearly three months! Now the south pole is in total darkness receiving no sunlight at all! As there is more sunlight in the northern hemisphere than in the southern part, the days in summer are longer than the nights there. Now the southern hemisphere experiences winter wherein the days are shorter than the nights. As the northern hemisphere receives the sharp, direct rays of the sun spread over a smaller area, it is very hot in summer.



Once again, on September 23, the day and night will be of equal duration as sunlight reaches both the poles. Now the earth will be exactly in the opposite position, in its orbit, to its position on March 21.

This is the autumn season for people in the northern hemisphere and spring for those in the southern hemisphere.

Once again, by December 22, the winter will begin in the northern part and summer in the southern part. This goes on and on as a never-ending cycle of seasons!



*When it is autumn in the northern hemisphere it is spring in the southern hemisphere.*

### **Things to remember**

1. Planets are wanderers. They are members of the solar system.
2. Mercury is the swiftest planet and it is the closest to the sun. One part of it is the hottest and the other part, the coldest.
3. Venus is the brightest planet.
4. Mercury and Venus are called morning and evening stars as they rise or set along with the sun.
5. There is life found only on planet earth. It has one moon.
6. Mars is the nearest planet to the earth. Mars has two moons.
7. Jupiter is the biggest planet. It has twelve moons.
8. Uranus and Neptune are called the green giants. Uranus has five moons.



9. Pluto is the coldest and the farthest planet of the solar system.
10. Earth pulls substances towards it due to gravity.
11. Rotation of the earth causes day and night. Time taken for one complete rotation is twenty-four hours.
12. The revolution of the earth round the sun in an elliptical orbit and the tilting of the earth's axis cause the seasons. The time taken for one complete revolution is one year or 365 days.
13. In the northern hemisphere, winter begins on December 22, spring on March 21, summer on June 21 and autumn or fall on September 23.
14. When people who live in the northern hemisphere experience a particular weather, people in the southern hemisphere experience exactly opposite weather conditions. For example, if it is summer in the northern part of the earth, it is winter in the southern part.

### **Things to do**

1. Observe the sky on a clear night. Try to make out the star patterns you know and where planets like Jupiter and Saturn are positioned at  
a. dusk; b. midnight; c. dawn.  
Notice how they move from east to west and shift their positions in the sky.
2. Observe the moon for a week and note down in which part of the sky you see it as soon as it gets dark. See how it shifts its position during the week, as it travels from east to west each day.
3. Look into the newspaper report every day and note down the time for sunrise and sunset for four days. See whether you can make out any difference.
4. When you travel by train or car, note how the trees, mountains, buildings and lamp-posts appear to run backwards, when you move forwards. Thus you understand the fact that the sun, the moon and the stars appear to move from east to west when planet earth itself moves from west to east.
5. Collect colour pictures of various planets and put them up on your class display board.
6. Similarly, collect pictures showing various seasons in different parts of the world for your display board.

### **Exercises**

1. Answer briefly:
  - a. What are asteroids? Where are they found?



- b. Which planet has a ring?
  - c. Which is the swiftest planet?
  - d. Which is the largest planet?
  - e. Which is the planet nearest to the earth?
  - f. Which planets are called the morning and the evening stars?
  - g. What is rotation? What does it cause? How long does it take for planet earth to complete one rotation?
  - h. What is revolution?
  - i. What is one year?
  - j. Which factors cause the seasons?
2. Answer in detail:
- a. Explain why it is winter in the northern hemisphere when it is summer in the southern hemisphere.
  - b. When people in the northern part of the world experience the spring season, why is it autumn or fall for the people in the southern part of the world?
  - c. What do you know about the earth's gravity?  
Explain with an example.
3. Give reasons for the following:
- a. Mercury is the hottest as well as the coldest planet.
  - b. The sun and the moon appear to travel from east to west in the sky.
  - c. Mars is colder than the earth.
  - d. Life is possible only on planet earth.
  - e. Mercury and Venus cannot be seen at midnight.



## 11. Types of soil and its conservation

You know that life is impossible without air and water. There is yet another important thing we find on earth, the soil which supports plant life on which all other living things depend. Wherever the surface of the earth is not covered with water or barren rock, we find a layer of soil. Have you any idea how the surface of the earth got this blanket of soil?

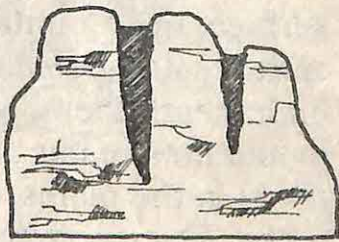
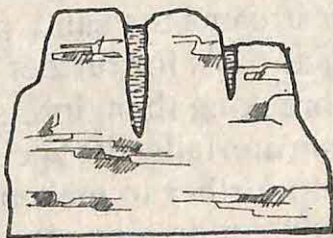
### Formation of soil

At the foot of a mountain or a hill you find piles of rocks of various sizes and shapes. Huge rocks are found on the slopes of mountains, some of them with great cracks. How do they happen? What will happen finally to the rock that is cracked?

You might think that the enormous strength of a giant is required to bring these rocks down to the foot of the hill or even to crack them. The wind has the great strength to roll the rocks down the hill and make them crack to form smaller ones. Another huge giant is the sun which heats up the rocks to a very high temperature day after day. The rocks which get heated up during the day cool down slowly after sunset only to be heated up again the next day. This repeated heating and cooling day after day and year after year causes the rocks



*Repeated heating and cooling causes rocks to crack.*



*Water freezing in cracks and crevices deepens the cracks.*



to expand and contract repeatedly so that they crack. Heating causes expansion and cooling, contraction of materials.

As they crack more and more, their surfaces slip off and fall away. The third giant is the water which enters into the cracks and crevices of rocks and freezes. Unlike other substances, water, when it freezes, expands slightly. This expansion in between the cracks of rocks further deepens the cracks and helps the rocks to split into smaller ones. Running water in the mountain streams also helps to bring them down the hill. While travelling downhill, they hit against one another and break into smaller pieces. Their sharp edges become blunt and thus rough rocks turn into pebbles and silt.



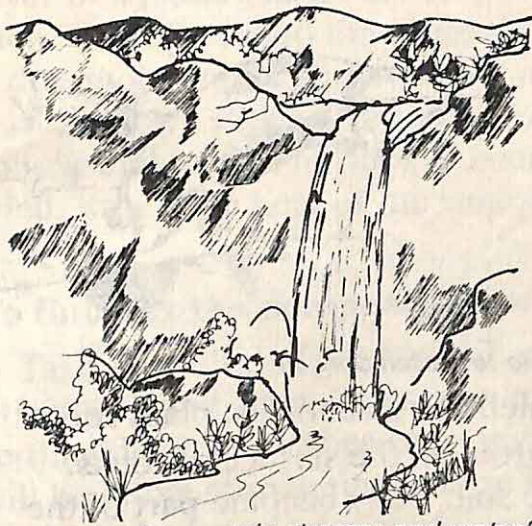
*Wind carves strange shapes in rocks.*

### **Action of the wind**

Wind carves many strange shapes in rocks. In place where there is no vegetation, the barren rocks are attacked by strong winds. These strong winds carry grains of sand quite high and make them dash against the rough surfaces of rocks. The sand grains themselves have such sharp edges that they are able to pound the rocks and chip off tiny pieces from their surface. As mentioned earlier, these rock pieces are carried away by the rain, the mountain streams and the rivers and get converted into soil particles of various sizes and shapes.

Just as the wind makes use of sand grains to chip off the rock's surface, the mountain streams use sand, pieces of rocks with rough surfaces and boulders as tools for further cutting the rocks underneath them, or breaking them into pieces. The force of the mountain streams and waterfalls, the speed of running water in the rivers in the plains, help further to make more soil particles from rocks. The rivers heap them up along their banks and carry a part of them to the sea. The waves of the ocean dash against the rocks on the





*The force of mountain streams and waterfalls helps to make soil particles from rocks.*



*The waves of the ocean pound the rocks with enormous force.*

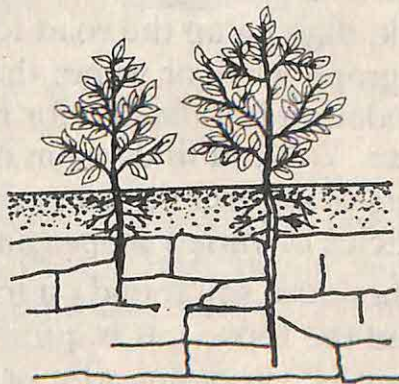
shore and pound them with enormous force and grind them to sand. This is what results in the formation of a sandy beach!

Ice-capped mountains have frozen rivers called glaciers. As the glaciers move down the mountain slopes and valleys, they grind and scrape the rocks beneath them and finally break them to pieces. The rock pieces which they carry along with them further act as tools to chop off more surfaces of rocks. On its journey down the valley, the glacier carries particles of soil and deposits them in the places where it melts due to warmth.

### **Plants and animals help in soil formation**

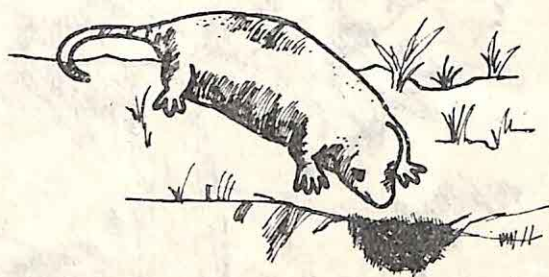
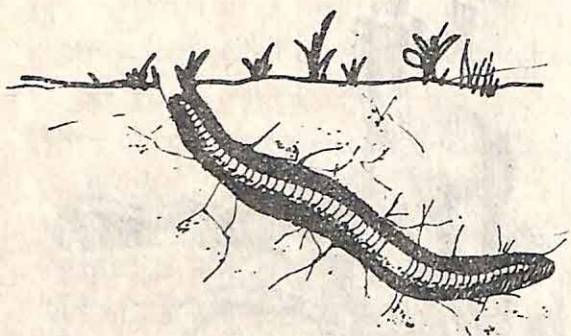
Plants manage to send their roots in between crevices of rocks and break them to pieces. Thus they also help in the formation of soil.

Burrowing animals like rabbits, moles, bandicoots and tiny earthworms help to loosen the soil and sometimes even enable the bigger soil particles to break into smaller ones. The soil thus loosened



*Plants send their roots into crevices of rocks.*





*Burrowing animals help to loosen the soil.*

permits the entry of air and water which are essential to plant roots.

Many plants like moss and lichen grow on the surface of rocks. Several varieties of plants grow in the soil. They become part of the soil when they die and decay. The rotting leaves, other parts of the plants and even dead animals mix up with the soil and form humus. This humus is rich in minerals which help in the growth of more plants. The animal wastes also form part of the humus.

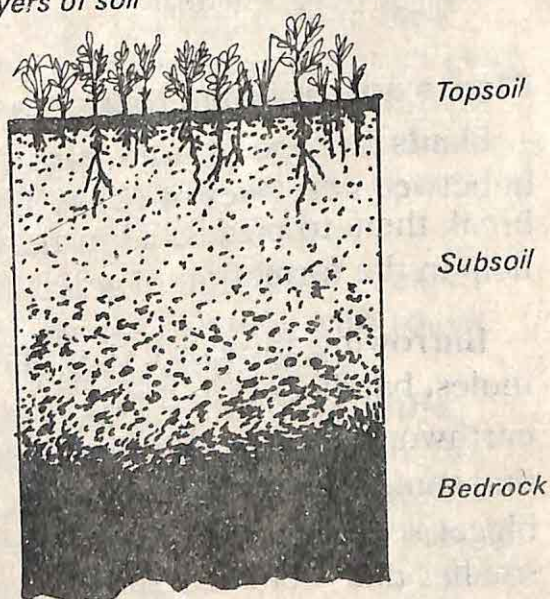
Thus soil is formed by various agents like the wind, the sun, water in various forms, plant roots and burrowing animals. It takes millions of years for rocks to turn into soil particles! This soil has spread over the surface of the earth in several layers, containing particles of varied shapes, sizes and composition. The minerals found in the soil, air and water help the plants to grow.

*Layers of soil*

### **Layers of soil**

Go to a place where men are at work, digging up the road for laying telegraph wires or where the foundation is to be laid for building a house. You can find soil in many layers of different colours with particles of varied shapes and sizes.

The loose soil found on top is called the topsoil. It is quite dark in colour as it contains a lot of humus. Below this you can find a soil

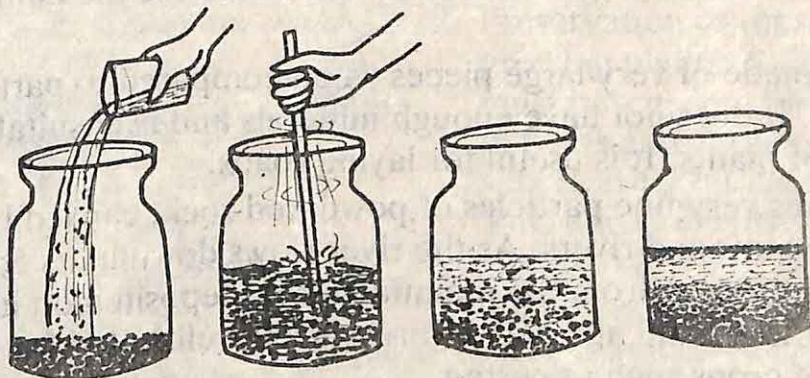




layer of a lighter shade called the subsoil, with bigger soil particles, more closely packed than topsoil. Subsoil is not rich in humus. Mostly it does not contain any minerals suitable for the growth of plants. Further down is the bedrock, containing solid rock from which the subsoil and topsoil must have been made millions of years ago by wind, water, the heat of the sun, plant roots and burrowing animals.

### **To find out the composition of garden soil**

Take a handful of garden soil and put it in a bottle containing water. Stir it well and allow it to settle down. You find the heaviest particles settling down first. These are probably the gravel. The layer above it will be of big sand grains (coarse sand). Above the layer of coarse sand can be found a layer of fine sand. The top-most layer will consist of fine clay particles which are very closely packed. Initially the water above these layers of soil will be muddy due to minute clay particles suspended in it. Humus floats on top of water.



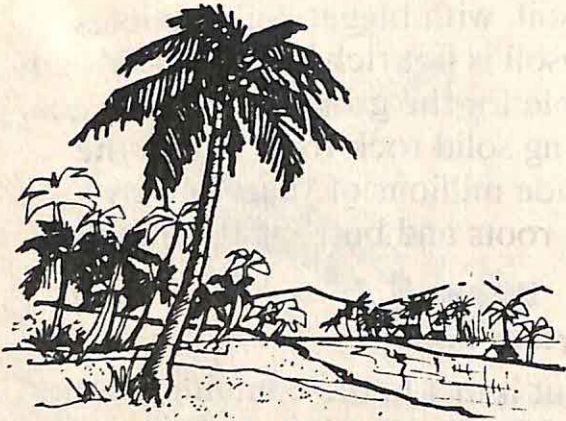
*Find out the composition of garden soil.*

### **Types of soil**

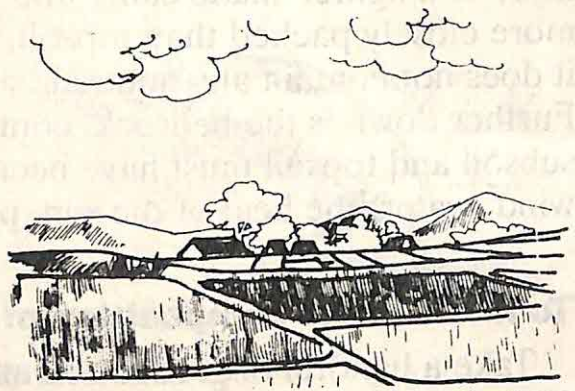
Sandy soil contains sand grains which can be seen and felt. The sand grains are loosely packed. So water drains off very fast through sandy soil; but it holds a lot of air. Plants like coconut and melon grow well in sandy soil.

Clayey soil has properties which are just the opposite of sandy soil.





*Coconuts grow well in sandy soil.*



*Clayey soil is suited for paddy cultivation.*

Here the clay particles are very closely packed, with no space between them. It absorbs water and retains it for a very long time. Due to lack of space between its particles, clayey soil cannot hold air. Water seeps through it very slowly. Clayey soil is a heavy soil. Its particles are very fine and soft. When they absorb water they swell. So what little air is found between them is thus driven away. Clayey soil is very sticky when wet and becomes very hard when dry and develops cracks on drying. This soil is well suited for the cultivation of paddy.

Gravel is made of very large pieces when compared to particles of sand or clay. It does not have enough minerals and is unsuitable for the growth of plants. It is useful for laying roads.

Silt contains very fine particles of powdered rock, carried by mountain streams and rivers. As the river slows down in its course, the silt it has brought from the mountains gets deposited on its banks. If it is mixed with sand and clay it forms a soil well suited for cultivation of crops such as cotton.

Loam is a mixture of clay, sand and humus in certain proportions. This is the best soil for the growth of crops as it has lots of minerals and air and can retain water.

## **Soil erosion**

The giants which help in the formation of soil are also responsible for the loss of topsoil which supports plant life. This process is called soil erosion.

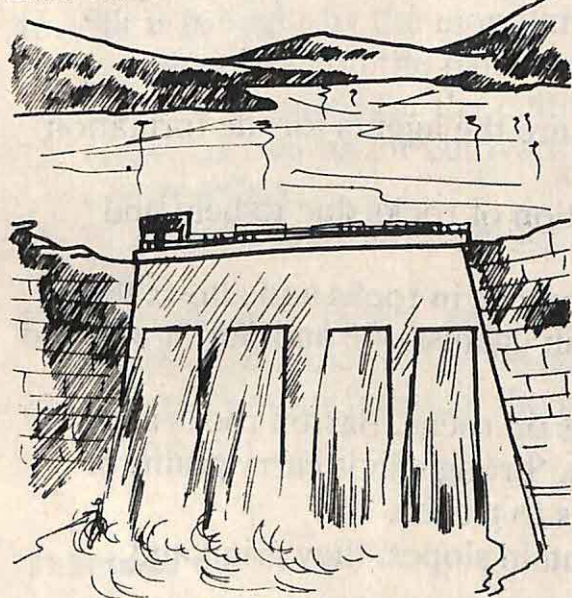


Normally, plant roots hold the soil very firmly between them and prevent the loss of topsoil by the force of wind or running water. If cultivable land is left without growing plants, the topsoil will be lost because of these agents of erosion. Similarly, overgrazing of grasslands by cattle, cutting down forest trees and forest fires leave the soil bare so that stormy wind or a heavy shower of rain can carry the useful soil to a place where it is not useful for growing plants. Landslides that occur on mountain slopes during the rainy season are also responsible for soil erosion. In summer, the sun bakes the soil and the hot dry winds carry it away. Thus what is built up through millions of years can be lost in a short while.

### **Prevention of soil erosion or methods of soil conservation**

1. Cultivation of fallow land: Even if the soil is not very rich, it can be tested and suitable fertilisers can be added to make it into cultivable land. This prevents soil erosion as plant roots bind the soil together.

*Dams and reservoirs prevent soil erosion.*



2. Preservation of topsoil by growing plants: Suitable plants must be chosen, for cultivation in fields and gardens, successively for each season. This also prevents soil erosion.
3. Prevention of floods: Construction of river bunds, dams and reservoirs prevents soil erosion as they help to control the speed of the flowing river. They also do not permit the river to overflow and carry away topsoil. Thus they help to prevent soil erosion by floods.

4. Terrace cultivation or contour farming: If mountain slopes are ploughed up and down, rain water will wash away the soil very quickly as it will run through the furrows swiftly. If ploughing is





*Terrace cultivation or contour farming helps in soil conservation.*

done across the slopes, making it look like a giant staircase, rain water will run down very slowly, and each furrow in the field will act like a tiny dam to hold the soil back.

This method is called terrace cultivation or contour farming.

### **Things to remember**

1. The sun, wind and flowing water are the agents for the formation of soil as well as for its erosion.
2. Repeated expansion and contraction of rocks due to heat and cold cause them to crack.
3. Swift flowing water deepens the cracks in rocks and allows them to break into smaller bits. They hit against one another, break and form silt and pebbles.
4. Wind carves many strange shapes on rocks. Barren rocks are attacked by wind and are broken. Strong winds carry grains of sand whose sharp edges cut rocks to pieces.
5. As glaciers move down the mountain slopes, they grind and scrape the rocks beneath them.
6. When water freezes in between the cracks of rocks, they widen the cracks due to a slight expansion and break the rocks to pieces.



7. Plant roots grow in between rocks and crack them to pieces.
8. Burrowing animals also help to break the bigger lumps of soil and make it loose for the entry of air. This helps the plant roots to get enough air for breathing.
9. Various parts of plants and dead animals get mixed up with the soil and decay. They form humus which is rich in minerals.
10. The best soil for the cultivation of plants is loam which contains a good proportion of sand, clay and humus.
11. The various layers of soil are the topsoil, the subsoil and the bedrock.
12. Topsoil is **rich in minerals** and it supports plant life.
13. Garden soil consists of humus, clay, fine sand, coarse sand and gravel.
14. Sandy soil is very loose. It holds a lot of air but allows water to drain off very easily. Sand particles are rough and fairly big.
15. Clayey soil does not have air as clay particles are very fine and swell due to absorption of water. So there will be no space between particles of clay for holding air. Water seeps through clay very slowly.
16. Silt is brought by the mountain streams and rivers to the plains. It gets deposited on the banks of rivers. It contains lots of minerals and is well-suited for the cultivation of crops.
17. Gravel is **useless** for cultivation of crops. It is used in road construction.
18. Plant roots **bind soil** together and prevent erosion by wind and water.
19. Cultivation of fallow land, contour farming, construction of river bunds, dams and reservoirs help in soil conservation.
20. Due to contour farming, the mountain slope looks like a giant staircase.

### Things to do

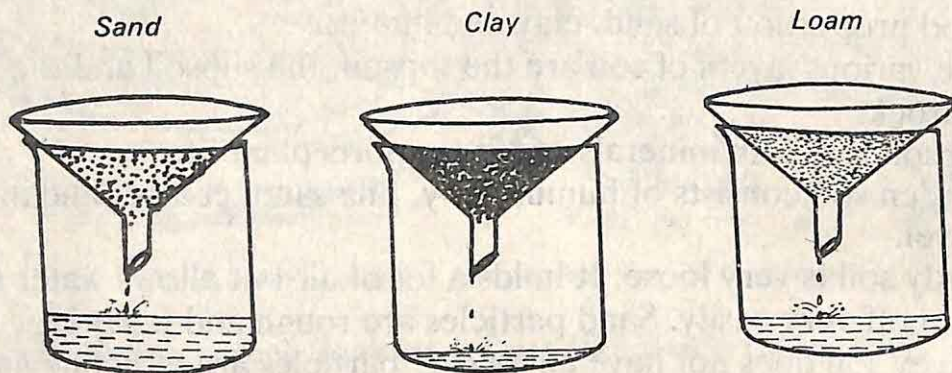
Simple experiments to show properties of soil.

1. Grow seedlings of balsam of the same size in sandy soil, clayey soil and loam. Watch them grow. In which soil do they grow well? Why?  
Sand drains off all water. So the plants die. Clay retains a lot of water. So



plant roots die due to lack of air. In loam they grow very well as they get all their requirements — air, water and minerals.

2. Take three funnels and place three beakers below them. Put equal quantities of sand, clay and loam in each funnel. Pour the same quantity of water in each of them. How long does it take for water to flow through each of them? How much water is collected in each beaker placed under the funnels? Why?



- a. As there is a lot of space between sand particles, water drains off very quickly. The soil retains very little water. So a lot of water is collected in the beaker.
  - b. As clay particles have very little space between them, water takes a long time to seep through it. As this soil absorbs a lot of water, very little water is collected in the beaker.
  - c. As loam has a good proportion of sand, clay and humus, it permits water to seep through it but also retains moisture in clay and humus. So water collected in the beaker is less than it is in the case of sand and more than in the case of clay.
3. When you travel by train or bus, observe how the action of wind and rain have produced barren rocks.
  4. Collect pictures to show how soil is lost and how it is saved. Make a chart and display it on your class display board.

## Exercises

1. Answer briefly:
  - a. Name the agents of soil formation.
  - b. Name the agents of soil erosion.
  - c. Name the various layers of soil.
  - d. What is topsoil? How is it useful?



- e. Name the sediments you get in garden soil, in the order of their heaviness.
  - f. Which soil permits air to enter into it?
  - g. Which soil does not permit water to seep through it quickly?
  - h. What is humus?
  - i. What is silt? Where do you find it?
  - j. What is loam?
2. Answer in detail:
- a. Explain how the following help in the formation of soil.
    - i. flowing water; ii. plant roots; iii. frozen water; iv. glacier; v. the sun.
  - b. Explain how contour farming helps in the conservation of soil.
  - c. How does the wind act as a giant in both the formation of soil and its erosion?
  - d. Draw a neat sketch to show the various layers of soil. Label the parts.
  - e. How are pebbles, sand grains and silt formed?
3. Identify the following:
- a. This type of soil has very fine, soft particles.
  - b. When we put some soil in water, we find this part of soil floating on water.
  - c. This is the best type of soil for growing crops.
  - d. Repeated expansion and contraction of rocks are caused by its activity.
  - e. This type of farming prevents soil erosion because this acts as a small bund or dam.



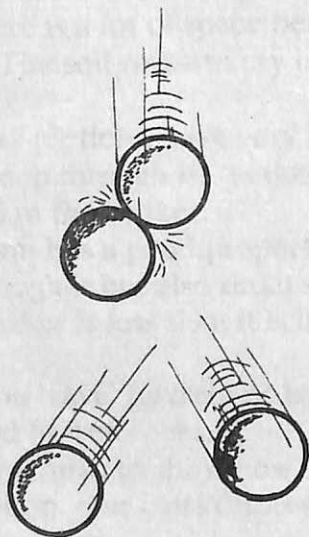
## UNIT VII FORCE, WORK AND ENERGY

### 12. Forms of energy and its application

#### What is force?

When you play marbles, you strike a marble and let it move. This marble strikes another one. Now both of them begin to move, of course in different directions. But the speed of the first marble is now lessened. From this you can understand what you mean by the term force.

Whenever the motion (movement) of an object is changed, a push or a pull is exerted. In science, this push or pull is called force.



*When one marble strikes another, they both move, but in different directions.*

If an object is at rest, a force is needed to start it moving. If an object is moving, a force is needed to slow it down or to stop it. If an object is moving in a certain direction, a force is needed to change that direction.

In the case of the marble at rest, the force with which the other marble hit it, made it move. The marble which was already in motion had to slow down because it hit against the marble at rest. It also changed its direction of motion due to this.

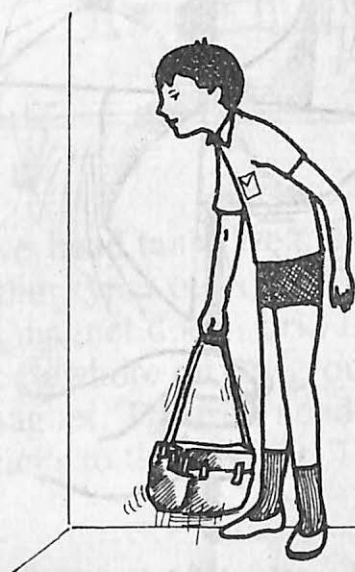
#### When is work done?

When you go to school, you lift your school bag from the table or from the floor. By doing this you have done work. You have used your



muscular force against the force of gravity to do this work. You have already learnt that all objects are pulled by the force of the earth's gravity. That is why when you have to lift any object, you will have to exert force against the force of gravity. You have actually lifted your school bag against the force of gravity, using your muscular force. Thus your muscles have done work! Do you know that scientists have estimated that human muscles do about one-sixth of the world's work?

Work is done whenever an object is moved through a distance by force.



*A lifted object does work.*

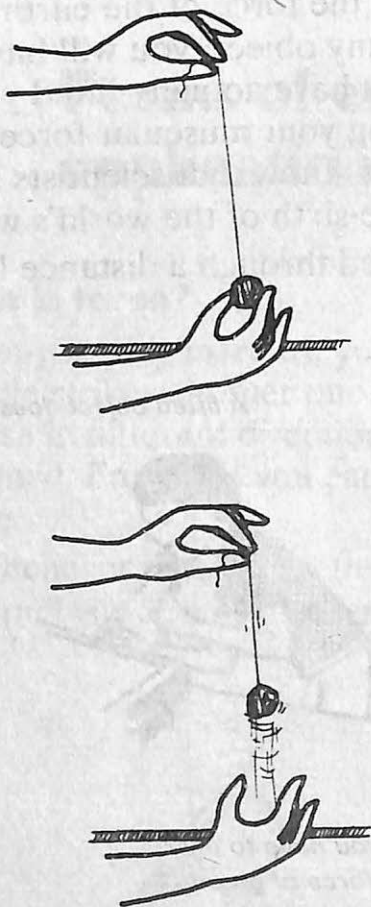


*To lift an object, you have to exert force against the force of gravity.*

### **Work is done in different ways**

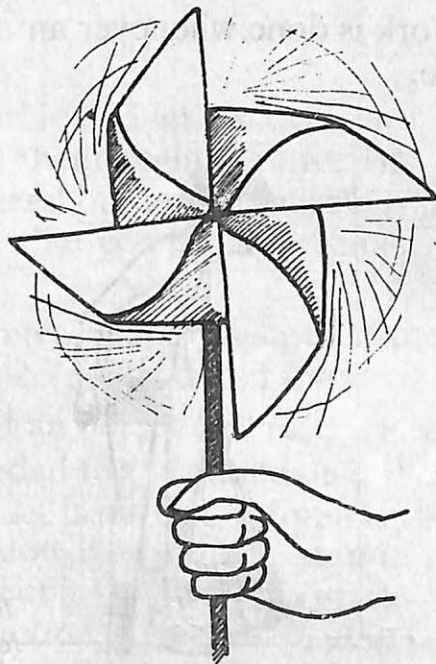
1. A lifted object does work. Lift a hammer and hit it on a nail kept on a piece of wood. The force with which the hammer hits the nail, drives it into the piece of wood. Work is done when the force of hitting moves the nail through a distance into the piece of wood. Thus a lifted object does work.
2. A stretched object does work. Tie a small stone to a rubber band. Press the stone on a table with one hand and stretch the rubber band with the other. Release the stone. Now the stretched rubber band pulls the stone upward. Thus a stretched object does work.
3. A moving object does work. Make a pinwheel and keep it in a place where the wind blows. Now the blades of the pinwheel turn





*A stretched object does work.*

because of the moving air! A windmill is thus used for grinding cereals, for pumping water from a well, for churning milk and even to turn an electric generator! Thus a moving object does work.

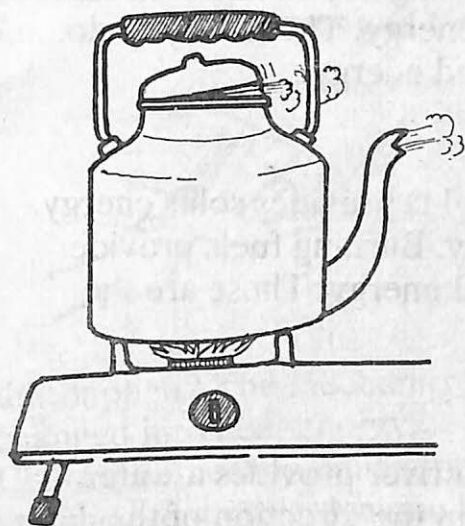


*A moving object does work.*

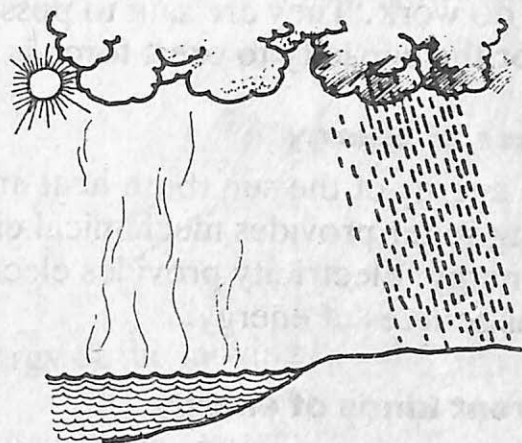
4. A burning substance does work. Fuels like wax, oil, spirit, gas and coal burn and produce a lot of heat energy with which many machines are made to work. At home, burning gas boils a kettle of water and the steam thus produced lifts the lid upward and so does work. Thus a burning fuel does work.
5. Sunshine does work. Water turns into water vapour due to the heat of the sun. Thus sunshine does work.
6. Flowing water does work. Rain water flows down the mountain streams or falls down as waterfalls with great force. It is capable of turning water wheels. Thus flowing water does work.
7. An electric current does work. Instead of using muscular force, we make use of an electric motor to lift up water from a well to the



*A burning fuel does work.*

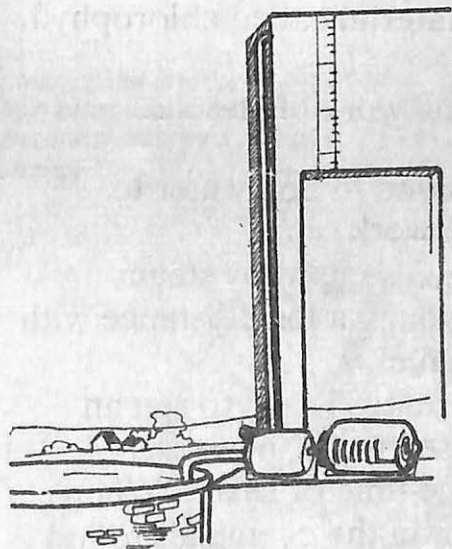


*Sunshine does work.*

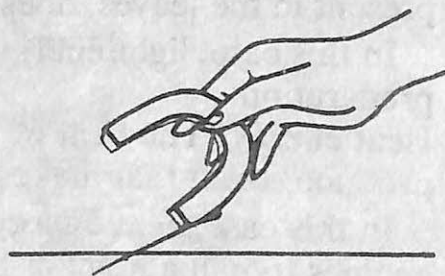


overhead tank. We make use of electric current for doing many other types of work. Thus electricity does work.

A magnet does work. If you have dropped a tiny needle somewhere on the ground, you can easily spot it out by using a magnet. The iron needle is attracted by the magnetic force and sticks to the magnet. Thus a magnet does work.



*An electric current does work.*



*A magnet does work.*

## What is energy?

You have seen how a lifted object, a moving object and a stretched object do work. They are said to possess energy. The ability to do work or the capacity to exert force is called energy.

## Sources of energy

The energy of the sun (both heat and light) provides solar energy. Flowing water provides mechanical energy. Burning fuels provide heat energy. Electricity provides electrical energy. These are the various sources of energy.

## Different kinds of energy

1. **Mechanical energy:** Flowing water in a river provides a water current which enables a boat to move in the direction of the current.

We make use of our muscular force to do a lot of work.

The wind lifts up huge waves from the ocean and they dash against the shore with great force.

In all these cases mechanical energy is used to do work.

2. **Light energy:** Light energy (solar energy) from the sun is trapped by green leaves to produce starch, using the raw materials carbon dioxide and water. The green colouring material called chlorophyll, present in the leaves, does this job.

In this case, light energy is used to do the work of starch preparation.

3. **Heat energy:** The heat of burning coal is used to boil water to produce steam that makes a steam engine work.

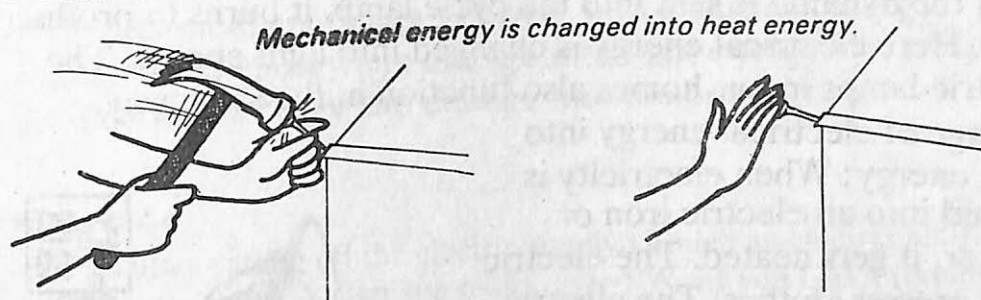
In this case, heat energy produced by coal is used by steam engines to pull a number of rail-bogies through a long distance with speed! In a diesel engine diesel is used as fuel.

4. **Electrical energy:** Instead of steam, electricity is used to run an electric train. Here, electrical energy is used to do the work.
5. **Chemical energy:** You light crackers at the time of Divali. When they explode, the chemical energy present in the chemicals found in crackers is put to work.



## Changing forms of energy

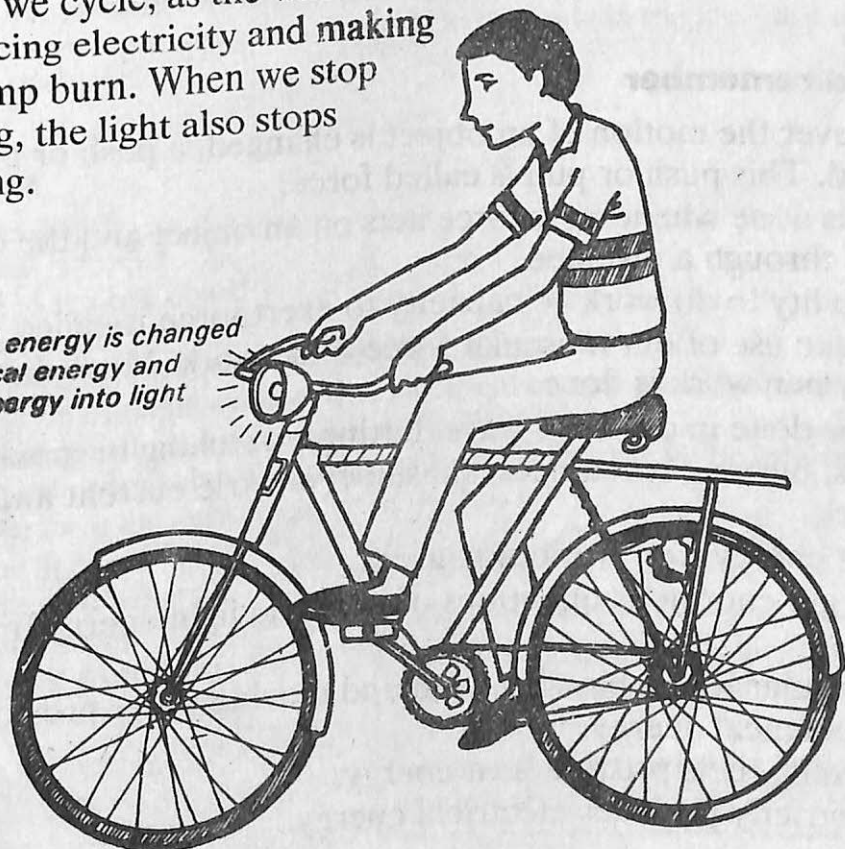
1. Change of mechanical energy into heat energy: Hit a nail with a hammer several times and then touch the nail. It is hot. How does



this happen? The mechanical energy of the moving hammer is changed into heat energy.

2. Change of mechanical energy into electrical energy: A light attached to a cycle dynamo **burns** only when electricity is produced. The dynamo **has to be** turned to produce electricity. When we cycle, as the **wheel turns**, the dynamo also turns, producing electricity and **making** the lamp burn. When we stop cycling, the light also stops burning.

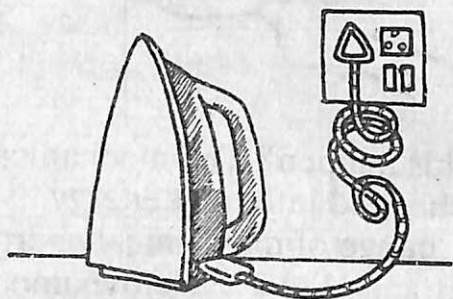
*Mechanical energy is changed into electrical energy and electrical energy into light energy.*



Thus, the mechanical energy of the turning wheel helps to turn the dynamo to produce electricity.

3. Change of electrical energy into light energy: When electricity from the dynamo is sent into the cycle lamp, it burns to produce light. Here electrical energy is changed into light energy. The electric lamps in our homes also function in the same way.
4. Change of electrical energy into heat energy: When electricity is passed into an electric iron or heater, it gets heated. The electric iron presses clothes. The electric heater boils water or cooks food.

Thus electrical energy is changed into heat energy. In this way we can trace a series of energy changes.



*Electrical energy is changed into heat energy.*

### **Things to remember**

1. Whenever the motion of an object is changed, a push or pull is exerted. This push or pull is called force.
2. Work is done whenever a force acts on an object and the object moves through a distance.
3. The ability to do work or capacity to exert force is called energy.
4. We make use of our muscular force to do work. Muscular energy spent when work is done.
5. Work is done in different ways. Lifting, stretching or moving objects, burning substances, sunshine, electric current and magnet do work.
6. We get energy from various sources.
  - a. We get enormous quantities of heat and light energy from the sun.
  - b. Muscular force, blowing wind and moving water provide mechanical energy.
  - c. Burning fuels provide heat energy.
  - d. Electricity provides electrical energy.



7. Energy present in one form can change into another form of energy.
- Mechanical energy can change into heat energy.
  - Mechanical energy can change into electrical energy.
  - Electrical energy can change into light energy.
  - Electrical energy can change into heat energy.

### Things to do

- (Do this after cutting off the electric supply.) Touch an electric bulb after it has burned for some time. Can you really do so? Won't you find it too hot? Here electrical energy has turned into heat energy.
- Switch on a radio set. You hear a speech or music. What produces this sound? Here electrical energy is changed into sound energy.
- Similarly, switch on a television set. You see a picture and also hear the sound. What actually happens here? The electrical energy is changed into sound energy and light energy.
- What happens when you light crackers? Chemical energy stored in the crackers produces light and sound. (Do this only in the presence of adults and with great care.)

### Exercises

- Answer briefly:
  - What is force?
  - When is work done?
  - What is energy?
  - Name any four forms of energy you know.
  - Give an example to show that electrical energy produces heat energy.
  - How can you make a magnet do work?
- State how energy changes from one form to another in the following:  
(choose from the answers given in the box)

- tube light
- burning crackers
- diesel engine
- electric oven
- mixie

heat energy into mechanical energy  
electrical energy into heat energy  
electrical energy into light energy  
electrical energy into mechanical energy  
chemical energy into heat and light energy

3. Fill in the blanks choosing words from the box given below:
- If an object is at rest, a ..... is needed to get it moving.
  - When you lift your school bag, you use your ..... energy to raise it against .....
  - Human **muscles** do about ..... of the world's work.
  - A ..... rubber band is used to shoot a stone to a great distance.
  - ..... **produce** a lot of heat energy and make machines do work.
  - ..... **energy** gives us both heat and light.
  - Green leaves ..... solar energy to prepare starch.

|           |       |           |
|-----------|-------|-----------|
| gravity   |       | stretched |
| solar     | force | muscular  |
| one-sixth | fuels | trap      |



# 13. Soluble and insoluble substances

## What is everything made of?

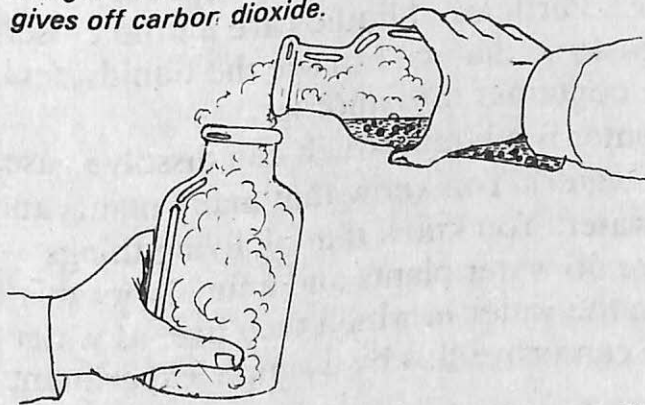
You see a lot of things around you, both living and non-living. You know that plants, which are living things, take in water and minerals from the soil and carbon dioxide from the air to prepare their food, starch. Now let us see what these three substances are.

## Forms of matter

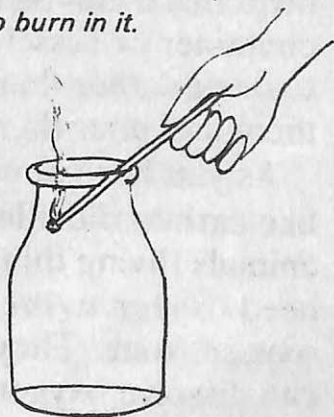
**Gas:** You know that carbon dioxide is a gas. It cannot be seen as it has no colour. It does not have any particular shape. But it can be kept in a bottle or collected in a bottle through simple experiments.

1. Take a little baking soda and pour some vinegar or lime juice in it. You see bubbles of gas coming out of it. This is carbon dioxide. If you keep another bottle under the mouth of this one, you can collect it easily.

*Vinegar or lime juice with baking soda gives off carbon dioxide.*



*Carbon dioxide does not permit things to burn in it.*



How do you know that you have collected carbon dioxide in the second bottle? Insert a burning splint (stick) into this bottle. It is

immediately put out. Carbon dioxide is a gas which does not permit things to burn in it. Do you know that it is used for putting out big fires?

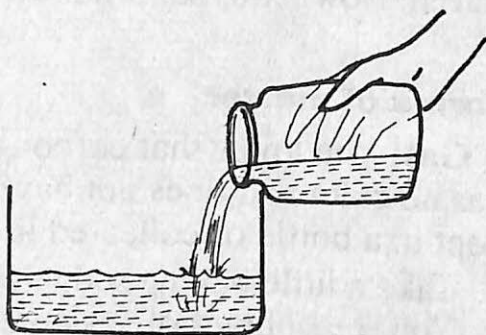
2. Open a soda-water bottle. The soda overflows as lots of bubbles of carbon dioxide escape from the bottle. Soda water is nothing but water in which carbon dioxide is dissolved.

What do you mean by a gas? A gas is a substance or matter which has particles that are very light and remain very far from one another. So they cannot be seen unless these particles have colour. Since gas is also a form of matter, it can occupy space.

*Liquids can be poured from one container into another.*



*Open a soda-water bottle.*



**Liquid:** Water is a liquid. It does not have colour or shape of its own. But it can be kept in a container and can be poured from one container or vessel into another. Particles of liquids are a little closer to one another than those of gases so that we can see the liquids, feel them and pour them from one container into another.

As you have already seen, water is a liquid which can dissolve gases like carbon dioxide in it (soda water). You know that many plants and animals (living things) live in water. You know that all living things need oxygen to breathe. Where do water plants and animals get this oxygen from? They get it from the water in which they live, as water can dissolve oxygen also! You can prove this by a simple experiment.

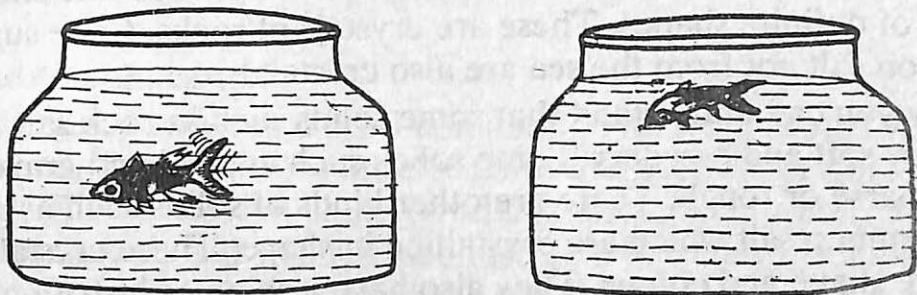
Take two bottles and keep fresh water in one and keep water boiled and cooled in another. Keep a fish in the first bottle for a few hours.



You can see that it is very active and keeps moving about. Keep some fish food in it. You can see the fish feeding on it. Now transfer the fish into the other bottle. Do not forget to put fish food in that bottle also. Then see what happens to it.

The fish feeds for some time. It slowly becomes less active and finally dies. This shows that there is no oxygen in the water which is boiled and cooled.

*Fresh water has oxygen dissolved in it but boiled water has no oxygen.*



This experiment shows that fresh water has oxygen dissolved in it and that it loses the dissolved gas when it is heated. This is the reason why you can see bubbles coming out when you heat water. These bubbles are of air dissolved in water. You also know that air contains oxygen.

You have already learnt that water, apart from dissolving gases like carbon dioxide and oxygen, also dissolves many substances, such as salt and sugar, to form their solutions.

**Solid:** When you say salt, you normally mean only common salt which we use for cooking our food. There are many more kinds of salt, some of which are soluble and some of which are insoluble in water. These salts are normally found as solids. Solid particles are so close to each other that they are found in lumps.

Mineral salts found in the soil dissolve in water to form their solutions which are absorbed by plant roots for preparing their food.

Solids exist in different forms. Soil itself consists of solid particles such as sand, silt, clay and gravel. The earth's crust consists of solid particles of different shapes, sizes, colours and textures.

You know that sand is rough or coarse and has sharp edges. Generally, sand is pale yellow in colour. Silt consists of fine particles of rock. Its texture is fine and it is darker than sand. Clay is very dark in colour and it consists of very fine particles which can easily be blown away by the wind when dry. Gravel is very big, coarse and hard.

## Crystals

If you examine some rocks carefully, you might see fine shiny things of definite shapes. These are crystals of rocks. Cane sugar and common salt got from the sea are also crystals!

Now you can understand that some solids such as rock salt and clay are very soft and powdery. Some solids such as sand and gravel are very coarse or rough. There are other kinds of solids such as sugar and common salt which are crystalline in shape. These crystals have a definite shape and colour. They also have a shine or lustre.

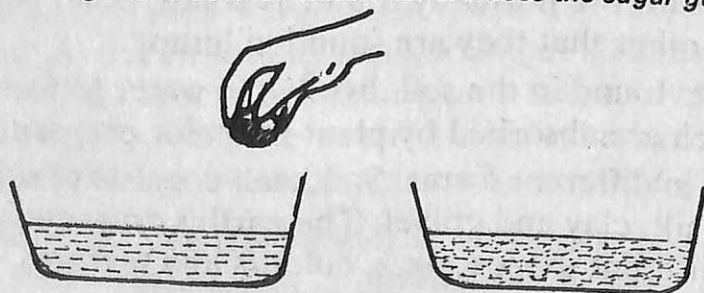
Quartz, copper sulphate, sulphur, common salt, washing soda and epsom salt are some crystalline substances.

## Soluble substances

Put a lump of sugar in a glass bowl containing water. Watch it closely. The sugar crystals gradually get smaller and smaller and finally disappear. Where do they actually go? What has really happened to them?

Particles of soluble substances or solutes occupy the spaces found in between the liquid or solvent particles in which they dissolve to form solutions.

*Put a lump of sugar in a bowl of water. Where does the sugar go?*



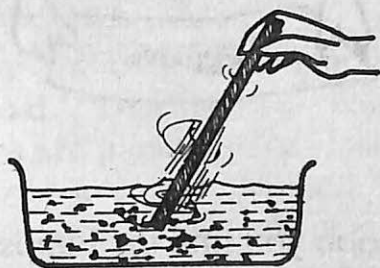


As sugar solution is colourless, we cannot make out whether it is a solution or not.

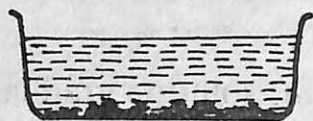
If we taste a few drops of it, we will know that it tastes sweet and hence it is a sugar solution. But if you dissolve a little copper sulphate (a blue, crystalline substance) in water, you get a blue solution of copper sulphate. Here, the colour of the solution itself tells you that particles of blue copper sulphate have occupied the spaces between water particles to produce a blue solution. Please do not try to taste this solution. It is poisonous!

### **Insoluble substances**

Add chalk powder to a bowl containing water, stir it well with a rod or a spoon. The solid substance remains undissolved, in spite of stirring. This shows that chalk powder is insoluble in water. Sand, clay, sulphur, oil and wax are also insoluble in water. Insoluble substances remain suspended in the solvent. If they are light, they float and if they are heavy they sink to the bottom of the container.



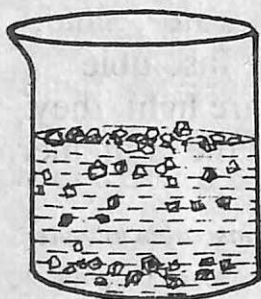
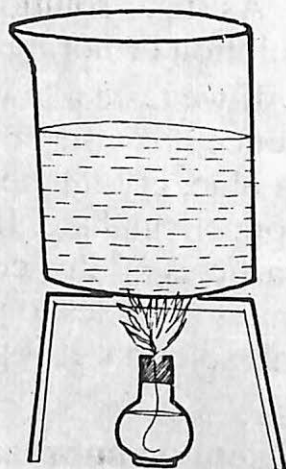
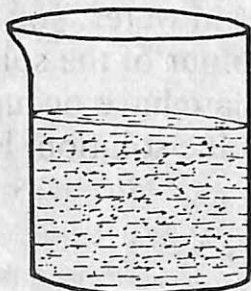
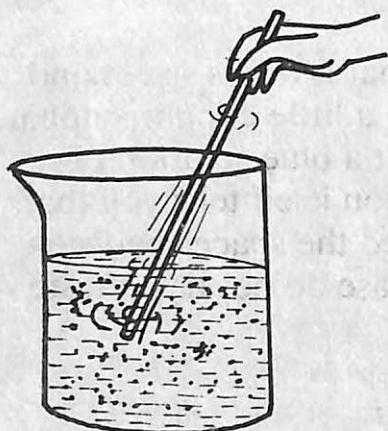
*Chalk powder is insoluble in water.*



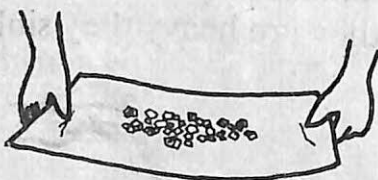
Now recall the methods by which you can separate insoluble substances from a liquid. They are sedimentation and decantation and filtration. By evaporation you get back the dissolved solid (solute) from the solution. By distillation, you get back the pure liquid (solvent) from an impure solution.

### **Crystallisation**

Take water in a beaker and add powdered copper sulphate to it little by little. Stir it well until it dissolves completely. After some time, however much you stir it, a lump of copper sulphate will remain undissolved in the solution.



*Pure copper sulphate can be obtained by crystallisation.*



Now heat this solution gradually. Soon you find the lumps of copper sulphate disappearing in the solution. Actually they have dissolved in a hot solution! In a hot liquid, the particles of liquid leave more space between them than in a cold liquid. So more solute particles occupy this space. That is, more solute dissolves in a solution when it is heated!

On cooling this hot solution gradually, the liquid particles move a little closer to one another and throw out the extra solutes in the form of fine crystals. These crystals will have a definite shape, size, colour and lustre. Decant the solution and dry the crystals using filter papers.

Copper sulphate is obtained as shiny, blue crystals. In this way pure substances can be obtained.



## Solvents other than water

You know that water is a good solvent. It dissolves many substances in it. But it cannot dissolve resins, camphor, rubber and sulphur. Solvents other than water dissolve these substances.

| Solvent              | Substances dissolved | Uses                                                                              |
|----------------------|----------------------|-----------------------------------------------------------------------------------|
| 1. alcohol           | camphor, resin       | Camphor solution is used to produce celluloid. Resin solution polishes furniture. |
| 2. naphtha           | rubber               | Rubber solution is used to mend punctures in tyres.                               |
| 3. carbon disulphide | sulphur              | to prepare sulphur crystals                                                       |
| 4. kerosene          | wax                  | Kerosene removes wax from clothes.                                                |

## Things to remember

1. Everything we find on earth is made of particles of matter. Matter exists in three different forms — solids, liquids and gases.
2. Solid particles are packed very close to one another. Liquid particles are not so closely packed. So they can be poured from one vessel to another. Gaseous particles are found very loosely packed so that they cannot be seen if they have no colour. They can easily escape from their container.
3. Plants take in all these three forms of matter to prepare their food. They are carbon dioxide (gas), water (liquid) and minerals (solids).
4. Carbon dioxide is prepared when vinegar or lime juice is added to baking soda.
5. Soda water is nothing but water in which carbon dioxide is dissolved.
6. Living things use oxygen found in air for breathing. Aquatic plants and animals use air or oxygen dissolved in water for breathing.
7. On heating water, air escapes from it. So water if boiled and cooled cannot support life.

8. Solid particles found on the earth's crust are of different shapes, sizes, colours and textures.
9. Water is a good solvent. It dissolves many substances in it.
10. Crystals are solids having regular shape, colour and lustre.
11. Crystals of a substance like copper sulphate can be prepared by dissolving a large quantity of the substance in water at a high temperature and then cooling it gradually.
12. The extra substance that gets dissolved at a high temperature is thrown out as crystals.
13. Insoluble substances remain as suspensions in the solvent (liquid).
14. Sedimentation and decantation, filtration, evaporation, distillation and crystallisation are the various purification processes.
15. Alcohol, naphtha and carbon disulphide are some solvents other than water.

Alcohol dissolves camphor. This is used for making celluloids.

Alcohol dissolves resin which is used in polishing furniture.

Naphtha dissolves rubber. Rubber solution is used by cyclists for mending punctures in their tyres.

Carbon disulphide dissolves sulphur which is used for preparing pure sulphur crystals.

Kerosene dissolves wax. This helps to remove wax from clothes.

### Things to do

1. Add some sugar to milk in a glass tumbler. What happens? You see the level rising. Now stir with a spoon. What do you see? The level once again goes down to show that sugar has dissolved in milk. The particles of sugar occupy the spaces between the particles of milk.
2. When sweets are prepared at home, watch carefully. What happens to the hot preparation when it is cooled? The liquid nature of the sweet when it is hot is lost when it is cooled. The liquid turns into a solid on cooling. Actually, the sugar crystallises on cooling. This is how sugar candy is prepared, through crystallisation!
3. When you open an aerated drink bottle, you see bubbles of gas coming out with the flavour of that drink. This gas is nothing but carbon dioxide. Aerated cool drinks consist of flavoured water containing dissolved carbon dioxide.
4. Take a beaker with water. Add a pinch of colour powder. Heat this coloured water. You see air bubbles coming out of it. Do you see any colour in the air that escapes? Only the water is coloured, not the air. Distil this solution and



collect the solvent, water. Distilled water is colourless. The coloured solute is left in the retort.

### Exercises

1. Answer briefly:
  - a. State how the particles of solids, liquids and gases are arranged.
  - b. Why does the level of milk go up when you add sugar? Why does it come down when you stir it with a spoon?
  - c. What are crystals?
  - d. What is the method of preparing crystals called?
  - e. Name the various processes which help in purifying substances.
2. Answer in detail:
  - a. Explain how you will prepare crystals of copper sulphate.
  - b. Explain how particles of sand, silt, clay and gravel look and feel.
3. Match the following:

|                   |         |                 |
|-------------------|---------|-----------------|
| water             | camphor | crystallisation |
| naphtha           | sugar   | clothes         |
| kerosene          | rubber  | celluloid       |
| carbon disulphide | wax     | cyclists        |
| alcohol           | sulphur | candy           |
4. Name a substance which can exist in all the three states of matter — gas, liquid and solid.

## **14. The human body**

### **Systems of the body**

The human body is a remarkable machine. The machine most familiar to most of you is a car. Let us compare the two. The car is made up of a number of parts like wheels, steering, battery, radiator, bolts and screws. So is the human body made up of a number of organs which form different systems. Each system is important for the proper functioning of the body.

The human body is protected and supported by the skeletal system (bones), like the outer frame-work of a car. Just as the car moves with the help of wheels, movement in the human body is brought about by a system of muscles of the limbs. The wheels are controlled by the steering. Similarly the nervous system (brain and nerves) directs the movement of muscles. It also controls the proper functioning of all other systems.

The human body needs food and water just as much as a machine needs fuel like petrol, diesel or coal. It has a digestive system (food canal, liver) which breaks down the food we eat to a simpler usable form.

It is essential that this broken down, simple food reaches every part of the body. The transport of food is brought about by the circulatory system (blood).

All parts of our body need energy to do their work. They burn the food to get this energy. This can be likened to the burning of coal in a train or of petrol in a car, to supply energy for its movement. To burn food, air is necessary. Air is brought into the body by means of the respiratory system (lungs).

Waste materials not needed by the body are sent out in the form of waste salts and gases, through the excretory system (lungs, kidneys).

But the one thing a human body can do which no machine can, is to



produce another body like itself. This it can do because of its reproductive system.

### **Systems work together**

Let us find out how many of these systems work together when you perform a simple action like running.

1. The bones of the skeletal system support and keep you erect.
2. The muscles of the leg help you to run.
3. The nervous system not only commands the muscles to move, but directs the way you have to go.
4. Air is taken in by the lungs.
5. The air is taken to the muscles of the legs very quickly by the blood. Here, it burns the food to give you extra energy for running.



*How many systems work together when you run?*

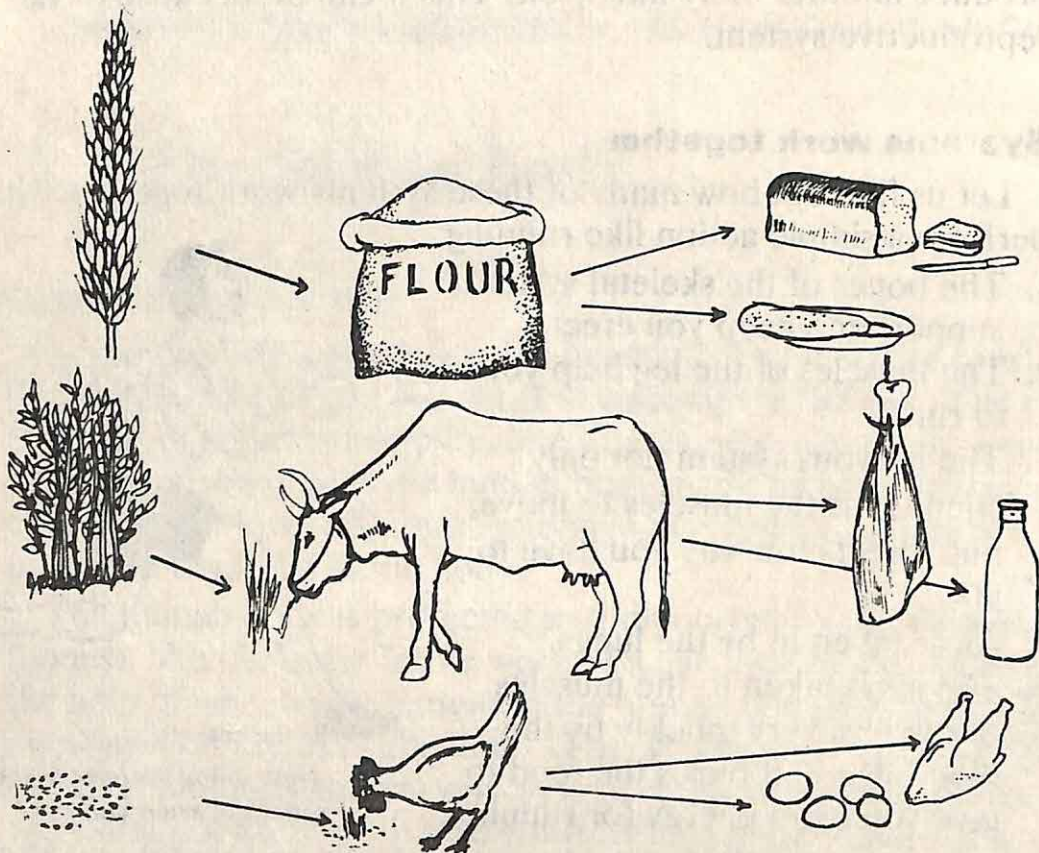
Now, do you understand what a wonderful and useful machine you are and how many systems function together to help you do what you want?

### **Food and digestion**

**Food types:** Any type of food we eat is got from plants or animals. Animals in turn depend on plants for their food. This is because only plants can make their own food.

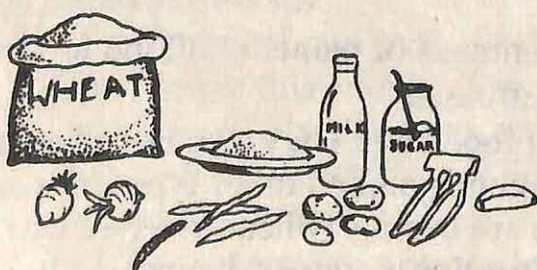
Whatever the source of food — animals or plants — all the food we eat belongs to one of the following groups:

1. Carbohydrates are energy giving foodstuff. They give us energy for running, skipping, climbing, swimming and all other types of work. Foods containing carbohydrates are cereals (wheat, rice, maize) and certain types of vegetables (turnips, potatoes, beans). Milk, bananas and sugarcane also contain plenty of carbohydrates.

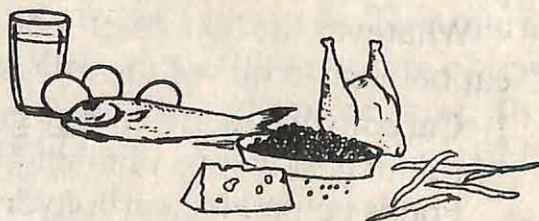


*Any type of food we eat is got from plants or animals.*

2. Proteins are body building foods. They are necessary for growth and repair of our body. Children need more protein than adults because they grow rapidly. Meat, fish, eggs, beans, peas, milk and cheese contain a lot of protein.



*Carbohydrates give us energy.*

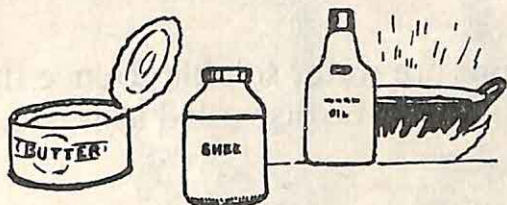


*Proteins are body building foods.*

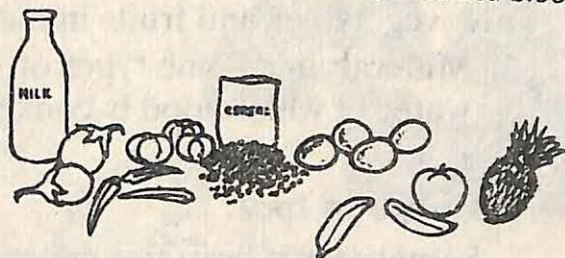


3. Fats also give us energy. Fats supply more energy than carbohydrates. Fats are present in butter, ghee and cooking oil.
4. Minerals are necessary for healthy bones, teeth, skin and blood. Our bones and teeth are made up of two minerals — calcium and phosphorus. Blood contains iron. Some food types that contain minerals are milk, vegetables, beans, peas, cereal, eggs and fruits.

*Minerals are necessary for healthy bones, teeth, skin and blood*

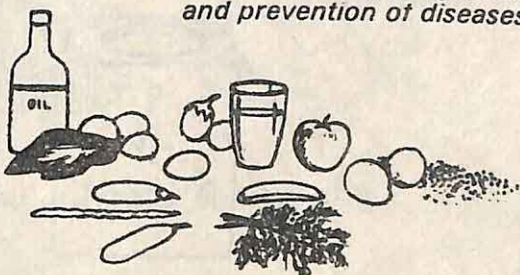


*Fats also give us energy.*



5. Vitamins are essential for growth, health and prevention of diseases. Many types of food we eat have vitamins — milk, eggs, liver, oils, vegetables, fruits and cereals.

*Vitamins are necessary for growth and prevention of diseases.*

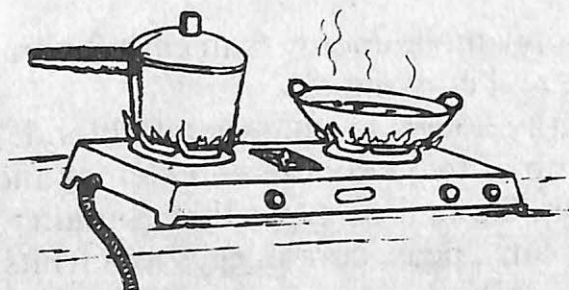


Water in plenty is needed by our body. It is as important as the oxygen we breathe in. We must drink a lot of water to make up for the water we lose when we sweat or pass urine.

## **Cooking of food**

Most of the food that we eat is not eaten raw. We cook the food. Cooking has many uses.

1. Cooking makes food tasty and provides variety. Can you think of some types of food which you prefer cooked?
2. Cooking makes food digestible. Thus meat, foodgrains, pulses and potatoes are softened and made easier to digest.
3. Heat kills the harmful germs and bacteria in food.



*Cooking has many uses as well as disadvantages.*

4. Cooked food can be preserved for a longer time than raw food.

But it is necessary to know the disadvantages of cooking also.

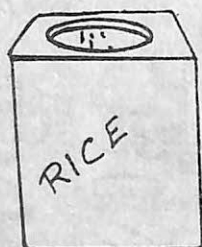
1. Too much heat may destroy foodstuff like protein.
2. Heat also destroys vitamins. Hence it is advisable to include

raw vegetables and fruits in meals.

3. Minerals and some types of vitamins are water soluble. Hence the water in which food is cooked should not be discarded as waste.

## Storage of food

Sometimes it becomes necessary to store food. If food is not stored properly it will lead to wastage. Different types of food are stored differently.



*Different types of food are stored differently.*



1. Some types of food should be kept in air-tight containers. (rice, wheat, flour, spices)
2. Some other types should be kept in open, airy, cool places. (vegetables and fruits)
3. Some types of food are preserved best by cooking. (boiled milk, jam, pickles)

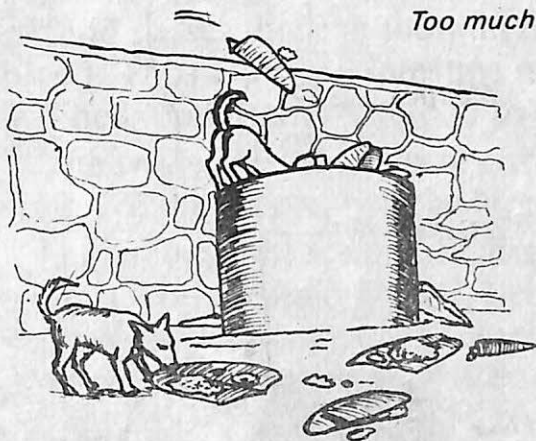
All types of food must be stored and preserved in clean places where there is no dust, insects or rodents.

## Healthy eating habits

1. Eat a well-balanced diet containing all the different types of food. Include raw vegetables and fruits in your diet.

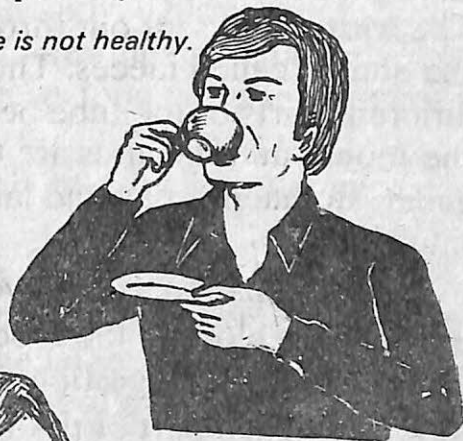


2. Meals should be taken at regular intervals with at least four hours between meals.
3. Drink at least five to six glasses of water per day.



*Do not waste food.*

*Too much tea or coffee is not healthy.*



*Drink plenty of water.*

4. Excess of beverages like tea and coffee is not healthy.
5. Avoid wastage of food.
6. Take good care of your teeth.
7. Food should be chewed and eaten slowly.
8. Regular exercise helps digestion of food and circulation of blood.

## **Digestion**

The different types of food that we eat have to be broken down and made soluble. Only then can the body use them for different purposes. Breaking down of food into small soluble substances is called digestion. Digestion takes place in the food canal. The muscular wall of the food canal and the digestive juices produced in the food canal help bring about digestion.

The food canal is a long coiled tube found in the body. Food enters the tube through one end of the tube — the mouth. Food then passes

through the tube and a part of the food which is not needed is sent out through the other end — the anus. The waste food sent out through the anus is called faeces. The different parts of the tube between the mouth and the anus are the gullet, stomach, small and large intestines.

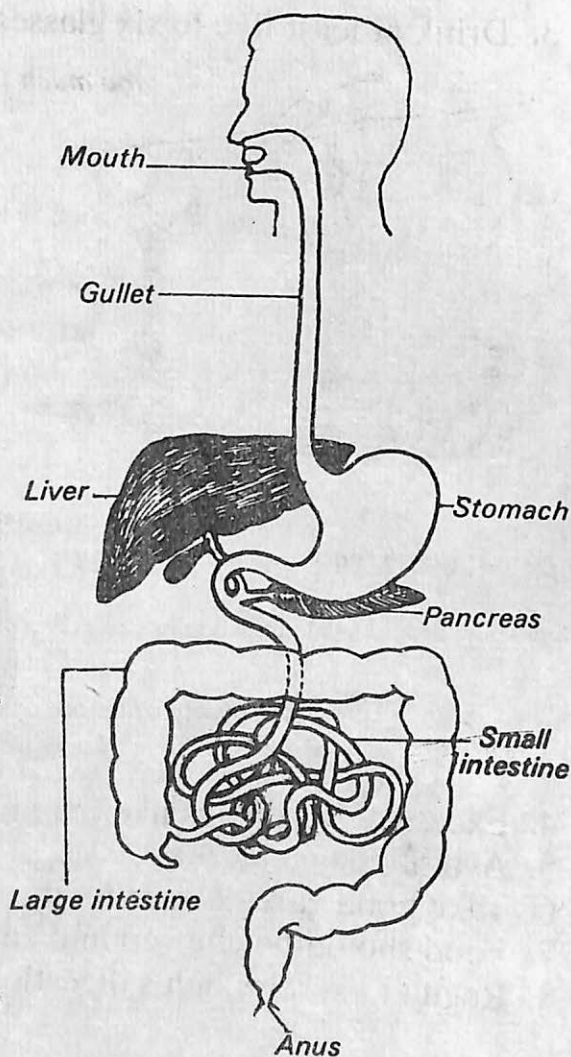
Liver and pancreas are two organs that lie very close to the food canal. They also help in digestion. Let us now study each part of the food canal and learn how each helps in digestion.

**Mouth:** In the mouth, the teeth help to break the food. The tongue moves the food around in the mouth. A digestive juice, saliva, breaks down starch, which is a type of carbohydrate. The chewed food then passes to the next part of the tube called the gullet. No digestion takes place in the gullet. It is just a passage through which food passes to the stomach.

**Stomach:** The stomach is the broadest region of the food tube. Its walls are tough and muscular and it acts like a grinder. It is like an elastic bag and stretches to take in large amounts of food. Here the food is moved around or churned. At the same time, the food is mixed well with a digestive juice produced in the stomach. This digestive juice helps in breaking down carbohydrates, proteins and fats. The food then enters the next region of the food tube, called the intestine, in the form of a semi-solid.

**Small intestine:** This region of the tube is tightly coiled. A digestive

*The food canal*





juice is produced in the small intestine also. Apart from this, the liver and the pancreas pour their juices into the small intestine. All these completely break down the various types of food into simple, small, soluble substances which can be used by the body. This usable form of food passes through the wall of the small intestine and enters the blood. Thus the small intestine not only digests food but also absorbs it. The blood carries the food to various parts of the body.

The waste food then passes from the small intestine into the next region of the food canal, the large intestine.

**Large intestine:** Since digestion is already completed in the small intestine, no digestive juice is produced in the large intestine. The walls of the large intestine absorb water. The large intestine opens out through the anus and the waste food is sent out of the body.

### Kinds of teeth

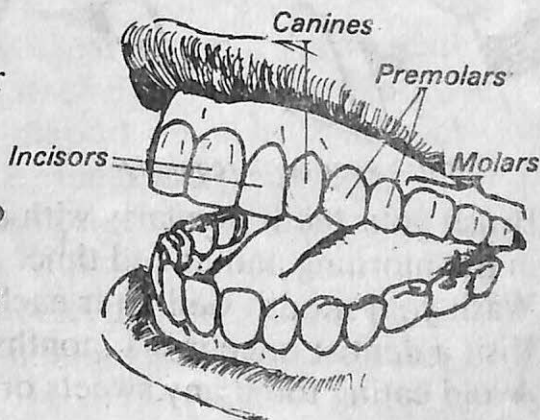
In our lives we have two sets of teeth. The first set remains until we are around seven years old. This is the set of milk teeth. The milk teeth are replaced by a permanent set of teeth. These number thirty-two in all. Examine the teeth within your mouth. Do they all look alike?

The teeth in front are called incisors. There are four in the upper jaw and four in the lower jaw. Their edges are sharp to cut food into smaller pieces. Incisors are very important for rodents like squirrels and rats.

Canines are present one on either side of the incisors. There are four canines altogether. Their edges are sharp and pointed. They are used to tear up tough food like meat. Can you name a few animals which have large canine teeth?

Next to the canines are the premolars. Their edges are flat and ridged. Each jaw has four premolars — two on the left side and two

*We have thirty-two teeth.*



on the right side. Thus there are a total of eight premolars in the mouth. The food is ground into small pieces when the premolars of the upper jaw rub against the premolars of the lower jaw.

The molars lie on the inner side of the premolars. They are similar in shape to the premolars, but are larger. There are twelve molars. Like the premolars, the food is crushed and ground by the molars. Cows and horses have powerful premolars and molars.

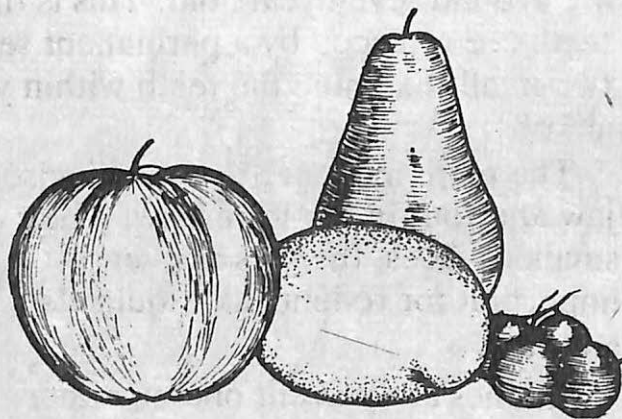
### Care of teeth

The second set of permanent teeth cannot be replaced by a third natural set. So it is important that we take very good care of our teeth. Food pieces get stuck in spaces between the teeth. If these are not removed, they will result in bad breath and tooth decay and so toothache. Ways of keeping teeth clean and healthy are:

*Fresh fruits and vegetables help keep teeth healthy.*



*Brush your teeth regularly.*



1. Brush your teeth regularly with a clean brush at least twice daily — in the morning and at bed-time.
2. Wash your mouth well after each meal.
3. Visit a dentist once in six months for a check-up.
4. Avoid eating too many sweets or drinking very hot or very cold drinks.
5. Fresh fruits and fibrous vegetables help keep teeth clean.



## Breathing

We breathe at all times whether awake or asleep. We are not even aware of breathing unless we stop and think about it. Have you noticed how breathing increases after you run or jump? This is because more air is needed during exercises. The organs that help in breathing are the lungs. They lie within our chest and are surrounded by bones. The breastbone is in front, and the backbone behind the lungs. The ribs cover the lungs at the sides. Thus the lungs lie safe in a bony cage. Beneath the lungs is an elastic muscular floor called the diaphragm. Not only do all these protect the lungs but they also help in breathing. Let us see how.

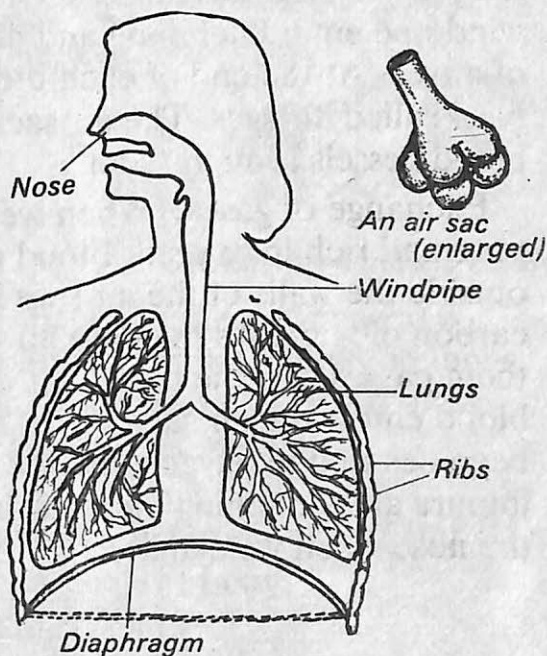
**Breathing in:** Look at yourself in the mirror and take in a deep breath. Can you see your chest expanding? Your chest expands because your ribs and breastbone have moved forward. Your diaphragm has moved downwards. Your lungs have more space and so take in air from outside. The elastic lungs are now like inflated balloons.

**Breathing out:** However much you try you cannot hold your breath for very long. You will see that your chest once again becomes flat. This is because your ribs, breastbone and diaphragm have come back to their normal position. Because of this the lungs are pressed and, just as air goes out in the balloon when pressed, air moves out of the lungs into the atmosphere through the nostrils.

**Organs of breathing:** We breath in or inhale, and breath out or exhale continuously. The air we breathe in passes through the nose, the windpipe and enters into the lungs.

When air enters the nose it is cleaned by the hairs present there. Germs and dust particles are caught. The air also becomes warm as it

*The breathing system.*



passes through the nose. So it is important that we breathe through our nose and not through our mouth.

From the nose air passes into a passage with strong stiff walls called the windpipe. The windpipe divides into two and leads one to each lung. There are two lungs, the left and the right. The tubes from the windpipe enter each lung and divide again and again like the branches of a tree. At the end of each branch is a group of tiny, round, hollow bags called air sacs. The air sacs have a number of blood tubes or blood vessels around them.

**Exchange of gases:** When we inhale, the air that enters the lungs is pure and rich in oxygen. Blood present in the blood vessels just outside the walls of the air sacs is filled with a waste gas called carbon dioxide. As the pure air enters the air sacs oxygen present in them passes into the blood. At the same time carbon dioxide in the blood enters the air sacs. After this exchange of gases, the blood becomes rich in oxygen and the air in the lungs, poor in oxygen. This impure air containing more carbon dioxide is then sent out through the nose when we exhale.

### **Healthy breathing habits**

1. The nose removes the dust particles in the inhaled air so that only pure air without germs enters the lungs. When we breathe in through our mouth the germs and dust particles are not removed and enter our body. This may cause illness.

Do not breathe through the mouth.

2. You have read how fresh air gets into the lungs when the chest expands. If tight fitting clothes are worn around the chest and waist they will make this movement difficult. Less fresh air gets in.

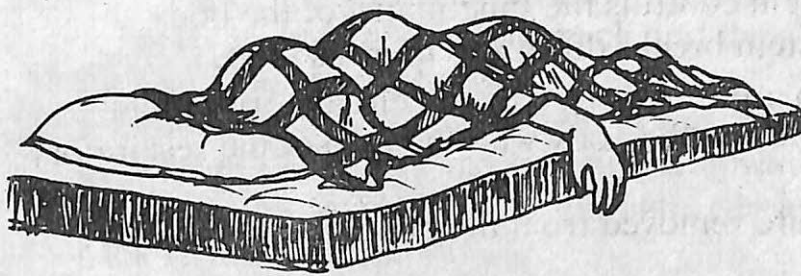
Do not wear tight-fitting clothes around the chest.

3. Some of us cover our faces with blankets when we sleep. There is no space for air movement. The bad air filled with waste gases which we exhale cannot move far away from us. So when we breathe in again we inhale this impure air instead of fresh air.

Do not cover the face while sleeping.



***Do not cover the face while sleeping***



***Smoking is injurious to health.***

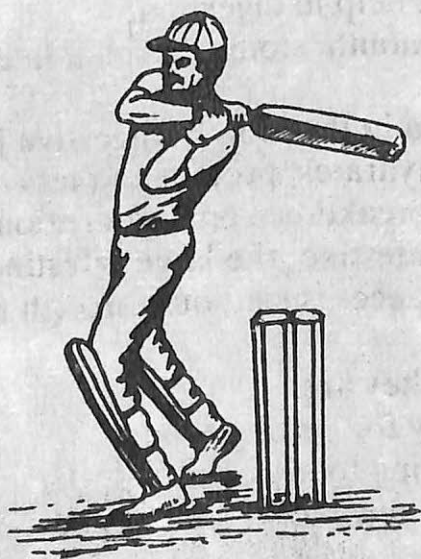
4. Cigarettes, cigars and beedis have tobacco in them. Tobacco is harmful to us. While smoking, the harmful smoke enters the lungs and injures them. This may even cause diseases like tuberculosis and cancer. These can lead to the death of the person.

Smoking is injurious to health.

5. Regular exercise and physical activities help breathing and improve the circulation of pure blood to all parts of the body.

Games and exercise keep you fit and healthy.

***Games and exercise keep your fit and healthy.***



## Things to remember

1. The body is protected and supported by the skeletal system.
2. Movement is brought about by the muscular system.
3. The nervous system controls the functioning of the body.
4. The digestive system breaks down and absorbs food.
5. Food and oxygen are transported by the circulatory system.
6. Oxygen is brought into the body with the help of the respiratory system.
7. Waste materials are removed from the body by the excretory system.
8. The reproductive system helps a living thing produce another living thing.
9. Food types are carbohydrates, proteins, fats, minerals and vitamins.
10. Cooking helps make food tasty, digestible and free of germs. It also helps preserve certain foodstuff.
11. Cooking harms certain food types particularly some types of minerals and vitamins.
12. Different kinds of food are stored in different ways. All kinds of food should be stored in clean places.
13. Breakdown of food into small soluble substances is called digestion.
14. Digestive juices present in the food canal bring about digestion.
15. Liver and pancreas are organs that help in digestion.
16. The food canal is made up of the mouth, stomach, small intestine and large intestine.
17. Carbohydrates are broken by saliva in the mouth; digestive juices in the stomach break down carbohydrates, protein and fats and food is also mixed well; complete breakdown and absorption of all food types occurs in the small intestine; the large intestine absorbs water. Waste food called faeces is sent out through the anus.
18. We possess 16 teeth in each jaw. They are
  - a. four incisors in front in each jaw for cutting food;
  - b. two canines in each jaw for tearing food;
  - c. four premolars in each jaw for chewing;



- d. six molars in each jaw for chewing.
19. Care of teeth and healthy eating habits are essential.
  20. The lungs are enclosed in a bony cage formed by the breastbone in front, the backbone at the back and the ribs which extend from the backbone to the breastbone.
  21. Breathing in involves movement of the diaphragm downwards and movement of the ribs and breastbone upwards and outwards.
  22. Breathing out involves the diaphragm, ribs and breastbone coming back to normal positions.
  23. The parts of the respiratory system are the nose, the windpipe and the lungs.
  24. The windpipe divides into two and enters each lung where it branches into tiny tubes. These tubes end in air sacs.
  25. Oxygen inhaled by the lungs enters into the blood vessels present on the walls of the air sacs. Carbon dioxide in the blood vessels enters into the lungs. From here it is sent out when we exhale.

### Things to do

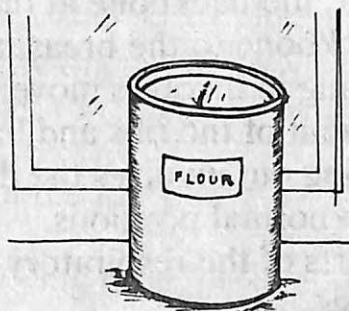
1. Make a note of what type of food you have for a day.

| Date | Meal      | Kind of food | Type of food                           |
|------|-----------|--------------|----------------------------------------|
|      | Breakfast | Idli         | Carbohydrate (flour) + protein (pulse) |
|      | Lunch     |              |                                        |
|      | Tea       |              |                                        |
|      | Dinner    |              |                                        |

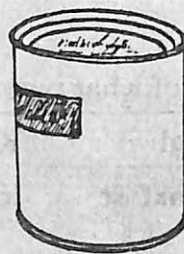
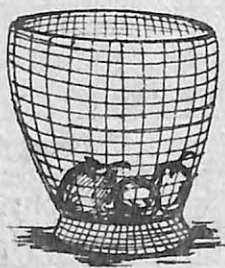
See if you have included all the types of food.

2. Take two small tins. Place a little flour in each. Place one tin, without covering it in a moist place (or sprinkle some water). Cover the other tin tightly with the

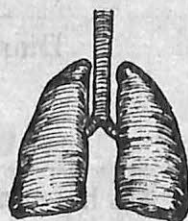
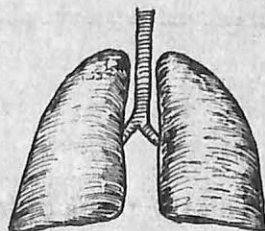
lid and keep in a dry place. Examine the two tins after a week. What do you see? You will see fungi and or worms in the first while the second is clean. What do you learn from this?



3. In the same way take two brinjals, lady's fingers or any other green vegetable. Place one in a porous basket. Sprinkle some water or leave it in the fridge. The other vegetable is left in an air-tight tin. Examine them everyday to see which one remains fresh longer than the other. You will see that the one left in the tin is spoilt earlier. Compare this experiment with the previous one you have done.



4. Blow air into a balloon. See how it bulges out. Next, let the air out. See how it shrinks. Our lungs expand due to inhalation and contract due to exhalation in the same manner.





5. Make a note of the type of teeth your pets have. Which type of teeth is prominent in each of them? Why? Visit a zoo and find out about the types of teeth different animals possess. Do this from a distance, and check it in a book. Also find out what type of food they eat and how they eat food and drink water.
6. When you or someone else does the following actions, find out if your/their breathing rate increases or not:
- running
  - sleeping
  - reading
  - climbing stairs
  - visiting a hill station
  - skipping
  - swimming



### Exercises

1. Answer briefly:
- a. What are the bones that surround the lungs?
  - b. What is the diaphragm?
  - c. What happens to the ribs and breastbone when you breathe in?
  - d. Why should we breathe through our nose?
  - e. Where does exchange of gases take place?
  - f. What are the various food types?
  - g. Mention two sources of each food type.
  - h. Mention one way in which cooking helps and harms food.
  - i. What kinds of food should be stored in cool places?
  - j. What is digestion?
  - k. Name the digestive juice produced in the mouth. What type of food does it act upon?

1. Mention two organs found close to the food canal which help in digestion.
  - m. What is the tube connecting the mouth and stomach called?
  - n. Why is the stomach broad and elastic?
  - o. What are the two functions of the small intestine?
  - p. What are milk teeth?
  - q. What are the different sets of teeth found in man?
  - r. Mention two ways in which you would take care of your teeth.
2. Answer in detail:
- a. What changes happen to the lungs and the bones surrounding them, when we breathe in?
  - b. What regions does the inhaled air pass before it reaches the air sac?
  - c. Write a few sentences on exchange of gases.
  - d. Why is smoking harmful?
  - e. Write three sentences each on proteins and minerals.
  - f. Why should we include raw vegetables and fruits in our meal?
  - g. Write a paragraph on digestion in the small intestine.
  - h. How do the different kinds of teeth help us?
3. Fill in the blanks:
- a. More air is taken in during ..... than when we are at rest.
  - b. The elastic muscular structure found between the chest and the belly which helps in breathing is the .....
  - c. When you breathe out your chest becomes .....
  - d. .... and ..... are caught by the hairs in the nose.
  - e. The tiny, hollow bags in the lungs are called .....
  - f. The blood surrounding the air sacs has a waste gas called .....
  - g. .... and ..... are energy giving foodstuffs.
  - h. Cooking makes food .....
  - i. .... and some types of ..... are water soluble.
  - j. No digestion takes place in the ..... It is just a passage between the mouth and the .....
  - k. The stomach is the ..... region of the food tube.
  - l. .... is the coiled region of the food tube.
  - m. The ..... carries the food to various parts of the body.
  - n. If food particles are not removed from the mouth, they cause ..... and .....

4. Match the food types with their functions.

| Food type              | Function                |
|------------------------|-------------------------|
| carbohydrates and fats | prevention of diseases  |
| proteins               | energy-giving           |
| minerals               | body-building           |
| vitamins               | healthy bones and teeth |



5. Arrange the jumbled words in the correct order:  
lungs, windpipe, nose, airsacs, bigger tubes, smaller tubes
6. Mention what type/s of food (carbohydrates, protein, fats) are digested in the following regions:
  - a. small intestine
  - b. mouth
  - c. stomach
7. What type of teeth are well developed in these animals?
  - a. dogs
  - b. cows
  - c. mice
  - d. cats
8. Draw neat labelled sketches of the following:
  - a. types of teeth
  - b. food canal

## **15. Our clothes**

The basic needs of man are food, clothing and shelter. Wherever we live, we need all these three in various forms and types to suit the climatic conditions of the place. You have learnt how necessary food and shelter (homes) are for animals and man. Now let us see how important clothing is to us.

### **Kinds of clothing**

You wear different kinds of clothes made of cotton, silk or wool. You choose your clothes not merely to suit the climate but also to suit the occasion. Therefore we can understand that we need 1. protective clothing and 2. decorative clothing.

### **Protective clothing**

In very ancient times people had to tolerate severe heat or cold. Their clothes were mostly made of leaves and barks of trees. Prehistoric man did not have any clothing. But nowadays there is clothing to protect people against heat and cold.

In cold climates, people wear warm clothes made of wool, fur or leather. These materials are got from various animals such as sheep, silver fox, reindeer and other wool and fur-giving animals. People often wear black clothes as this colour absorbs the rays of the sun and keeps them warm.

In warm climates, people use cotton clothes which can absorb sweat. They prefer to wear white clothes as this colour can reflect the hot rays of the sun and keep them cooler. Like cotton, linen is also used by people in warm climates. Both cotton and linen, apart from absorbing sweat, can admit even a slight breeze if the clothes are worn loose, particularly in summer.



*In cold climates, people wear warm clothes of wool, fur or leather.*



*In the rainy season, we use raincoats and gumboots.*

In the rainy season we use raincoats and gumboots to prevent our clothes from getting wet. They are made of rubber. Nowadays, plastic raincoats are available.

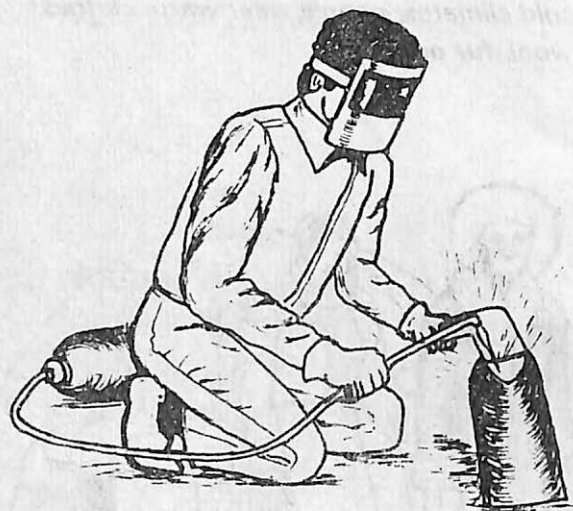


*In warm climates, people use cotton clothes.*



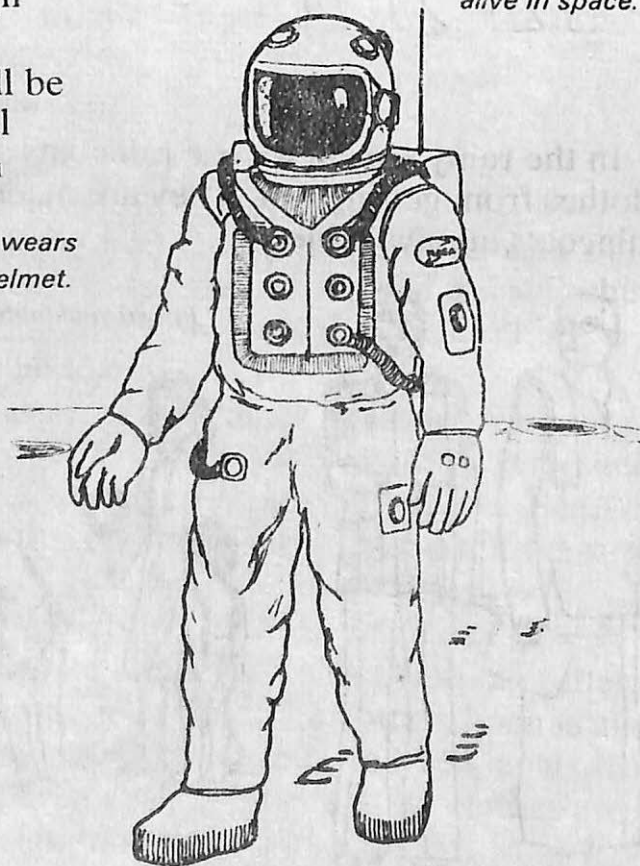
## Clothes for specialised jobs

Apart from normal clothing, people need to protect themselves when they do specialised jobs. A soldier wears a steel or a plastic helmet. A scooter or motorcycle rider also wears a helmet. Welders wear protective visors over their faces. This can protect them from fire and at the same time they can see through it. Foresters and woodcutters (lumbermen) wear heavy boots and trousers to protect them against poisonous snakes and thorns of plants. Jet pilots wear special suits, as they have to go very high in their jet planes where the conditions of the atmosphere will be different. Spacemen wear special space suits which will keep them alive in space!



*Welders wear protective visors.*

*Spacemen wear special suits to keep them alive in space.*



*A motorcycle rider wears a helmet.*







*Men and women are fond of decorating themselves.*

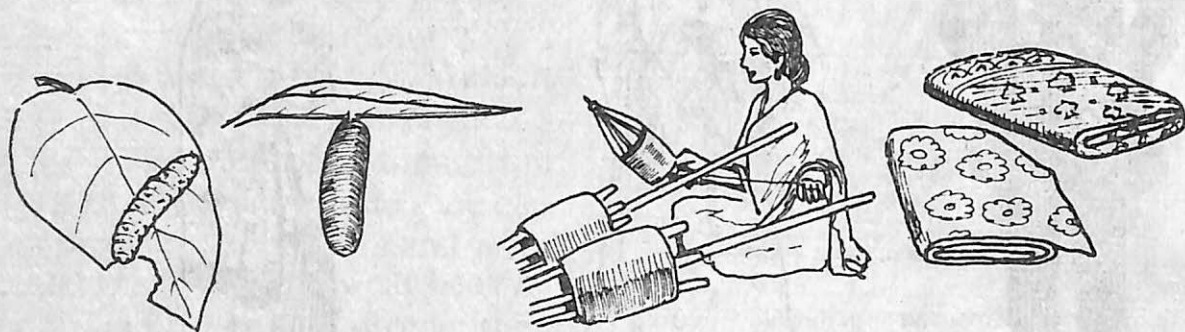
### **Decorative clothing**

Some children wear uniforms to school but they like to wear decorative clothes for parties and picnics. They dress up well on festival days. Men and women are very fond of decorating themselves. So they bring in new styles and fashions in making clothes to suit different occasions such as weddings and festivals. That is why we find a variety of patterns not only in skirts, trousers, saris, blouses, shirts, pants and suits but also in sweaters and even raincoats, gumboots and snowboots!

### **Clothing materials**

In ancient times, when most people were nomads, they merely draped the skins of animals over their bodies. They did not know how to cut or design clothes. When people started cultivating the land they stayed in one place and made clothes to suit different seasons and various occasions. People learned to spin thread from cotton and silk

and weave cloth. Similarly, before learning to weave wool into cloth or fabric, they knew the art of making felt. Felt is wool that has been moistened, pressed together and allowed to shrink into a thick, flat mass. You must have seen felt hats and coats. Their edges do not need hemming (a kind of stitching).



*Silk is got from the cocoon of the silkworm.*

Cotton and linen clothes are made from cotton fibres and from long fibres got from the flax plant. These two are the common plant fibres. Animal fibres are silk and wool. Silk is got from the cocoon of the silkworm. Wool is the hair of certain animals like sheep. Fur is the skin of animals.



*Woollen clothes are made from the wool got from sheep.*

### **Natural and artificial fibres**

Cotton, linen, silk and wool are natural plant and animal fibres. Coir is got from coconut fibres. Hemp is a stiff fibre got from plants like flax, lily and abaca. Jute is got from the jute plant.



Artificial or synthetic fibres are prepared from coal, petroleum and glass. They are nylon, orlon, dacron and fibre glass.

### **Advantages and disadvantages of using natural and artificial fibres**

Natural fibres are very comfortable to wear in any season. They will not spoil our skin. They are hygienic and washable. They permit proper air circulation and absorb sweat. However, they are not as tough and long-lasting as artificial fibres.

Artificial fibres are superior in quality to natural fibres. They are stronger and more elastic. They withstand repeated washing and scrubbing. They do not get worn-out as soon as natural fibres. Some of them are even heat-proof. But they do not allow air circulation and they cannot absorb sweat. If worn without frequent washing, artificial fibres cause skin diseases. Some artificial fibres like nylon catch fire and burn very quickly.

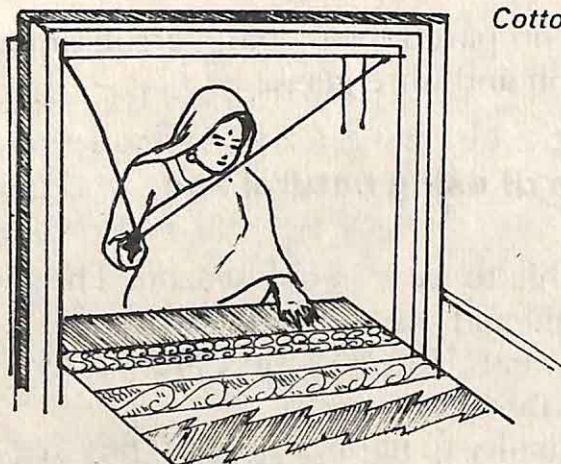
Fibre glass fabrics made from sand, limestone and soda protect us from fire, acid and heat.

### **Cloth making**

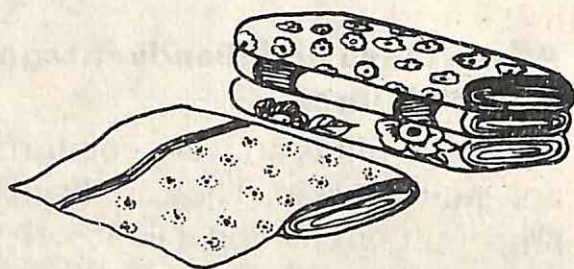
Cotton clothes for summer wear are made from fluffy fibres of raw cotton. Cotton bolls picked from the cotton plants are taken to the ginning machines to remove the seeds. Then the raw cotton fibres are

*Cotton is picked from the plant and spun into thread.*





*Cotton thread is woven into cloth.*



pressed and made into bales of cotton. These are sent to the cotton mills for spinning and weaving cloth. Natural and artificial dyes are used for dyeing and printing cotton cloth. Handspun and handwoven cloth is called khadi. If power is used for spinning and weaving is done by hand, it is called handloom fabric. Khadi and handloom fabrics are strong and long-lasting. But large quantities of cloth can be made only by using powerlooms. Such machine spun and machine woven cloth is commonly called mill cloth.

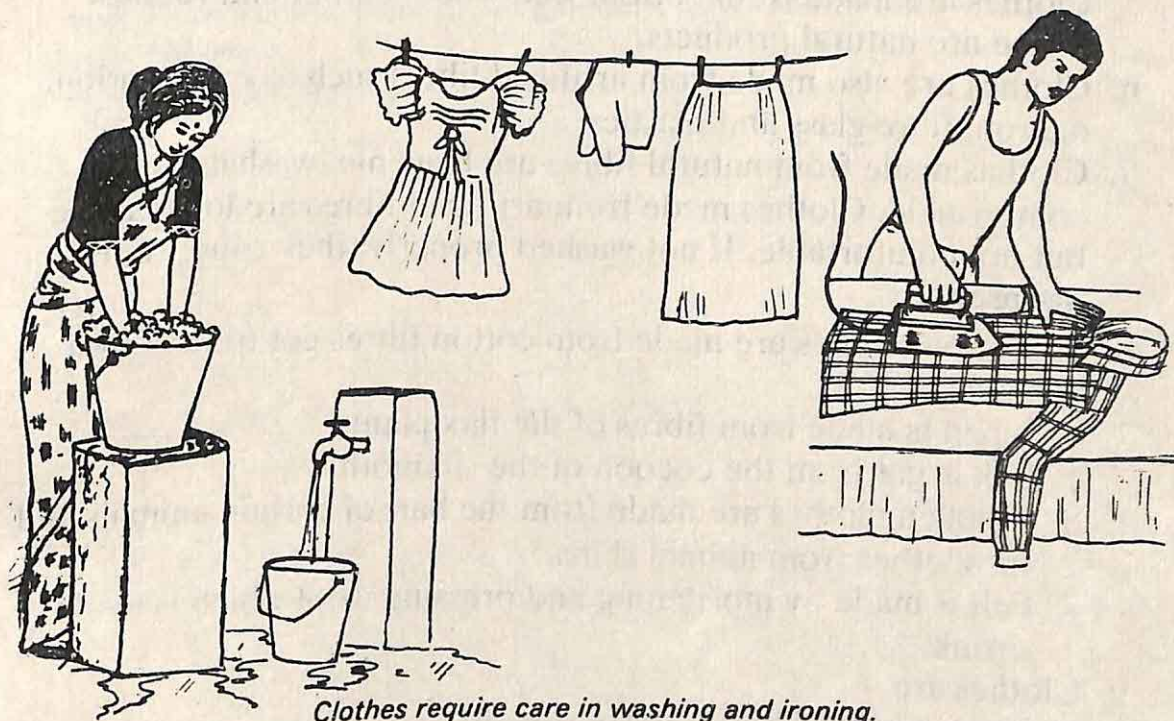
Woollen clothes for winter wear are made from different kinds of wool got from different kinds of sheep. Merino sheep grow short, fine wool for making fine clothes and hats and coats. Cross-bred sheep give coarse wool for socks and stockings. Blackface sheep give very coarse wool for sheets and carpets. The processes of spinning, weaving, dyeing and printing are also applied to woollen clothes.

### **Care of clothes**

Clothes require proper care. Only then will they be long-lasting. They must be washed with suitable soaps or detergents. Some soaps can spoil the fibre and make the colour run. Clothes must be rinsed properly in water to remove the soap completely. Excepting cotton clothes, other clothes should not be squeezed or twisted after rinsing. Twisting and squeezing spoil the artificial fibres. They should be left hanging until all the water drips off. Woollens and very fine silks may be given for dry-cleaning.



Clothes look neat when ironed. A hot iron should not be placed directly on woollen material. A moist cotton cloth must be spread on it when it is ironed. Woollen and silk garments require only moderate heat for ironing for else the fibres will burn. Certain artificial fibres do not require ironing.



*Clothes require care in washing and ironing.*

Some soaps and detergents remove fresh stains easily. Rust and bloodstains can be removed by using suitable stain-removers.

### **Things to remember**

1. The basic needs of man are food, clothing and shelter.
2. We need clothing for various purposes. Clothing can be protective and decorative.
3. Protective clothes are of different types.
  - a. In summer or in a warm climate cotton clothes are worn.
  - b. In winter or in a cold climate woollen clothes are worn.
  - c. Raincoats and gumboots made of rubber are worn during the rainy season.



- d. Helmets, visors, heavy boots and trousers of lumbermen, suits of jet pilots and space suits are special types of clothing worn for specific purposes.
4. Decorative clothes with special designs and patterns are worn for special occasions.
  5. Clothes are made from cotton, silk, wool, leather and rubber. These are natural products.
  6. Clothes are also made from artificial fibres such as nylon, orlon, dacron, fibre glass and plastics.
  7. Clothes made from natural fibres are hygienic, washable and comfortable. Clothes made from artificial fibres are long-lasting but not comfortable. If not washed properly, they cause skin diseases.
  8.
    - a. Cotton clothes are made from cotton fibres got from cotton bolls.
    - b. Linen is made from fibres of the flax plant.
    - c. Silk is got from the cocoon of the silkmoth.
    - d. Woollen clothes are made from the hair of certain animals and fur clothes from animal skins.
    - e. Felt is made by moistening and pressing wool which is made to shrink.
  9. Clothes are
    - a. hand spun and hand woven (khadi);
    - b. powerloom spun and hand woven (handloom fabrics);
    - c. machine spun and woven (mill cloth).
  10. Dyeing and printing are done after weaving cloth.

### **Things to do**

1. Use a 'thakli' or 'charka' and learn to spin cotton yarn. It is a useful hobby.
2. Visit places where handloom fabrics are prepared. Note the various stages in cloth making.
3. Find out through books or films how cotton and woollen mills function.
4. Visit places where printing and dyeing are done on a small scale. You can understand this by watching films also.
5. Collect bits of fabrics of various types and display them on your class display board, neatly labelled.



## Exercises

1. Describe a school uniform in three or four sentences.
2. Which type of dress do you like best? Why?
3. How do you protect yourself when you go to school in the rainy season?
4. Name the various types of sheep and the kinds of wool they give us.
5. Have you seen a cotton plant? Have you felt how soft the cotton is in a cotton boll? Draw a cotton plant showing flowers, leaves and cotton bolls. Colour your drawing.
6. Write a paragraph on 'care of clothes'.

## 16. Dealing with fire and water

Children like to light crackers and they like swimming too. Both these activities are enjoyable. At the same time, they need a lot of care and training. Before doing such things, children must be made aware of the dangers and difficulties they will face if they are careless.

### Fire accidents

Fire accidents do not occur only through crackers. There can be many other causes for them. We should learn about the measures to be taken in case such accidents occur and also learn how to prevent them.

### For children

What to do if your clothes catch fire:

1. Do not run if your clothing catches fire. Running spreads the flames.
2. Roll on the ground so that the flames can be put out. If a thick blanket is available, wrap it round yourself and roll on the ground. This puts out fire very quickly as the blanket shuts out air.

*Do not run if your clothes catch fire.*



*Wrap a blanket round yourself  
and roll on the ground.*





What should be done to avoid fire accidents?

When you light crackers:

1. Do not wear clothes made of artificial fibres. They catch fire easily.
2. Make sure there is an adult with you.
3. Keep a bucket of water close by.
4. Wear sandals.

To avoid fire accidents in the kitchen:

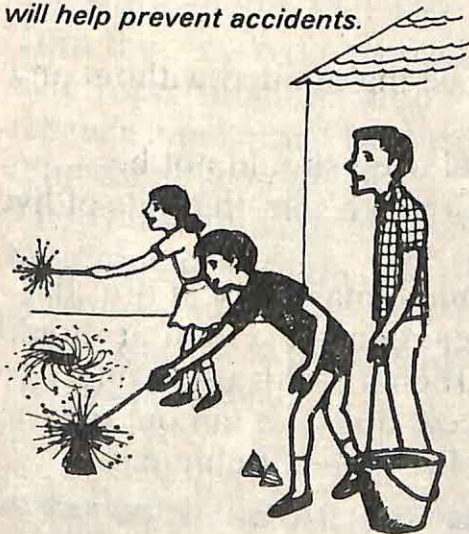
1. Do not go near the stove or try to use matches until you have been taught how to use them.
2. Do not pull at the clothes, or hug, or in any way startle, a person who is cooking.

### Fire prevention

Many fire accidents are caused by carelessness and lack of common sense. Some basic precautions can help avoid accidents.

1. A house should be kept orderly and neat.
2. Paper bits and oily rags should be thrown into closed dustbins.
3. A burning matchstick should be put out after use before it is thrown away. Cigarette butts should be thrown out only after stubbing out the burning end.

*Safety measures before lighting crackers will help prevent accidents.*



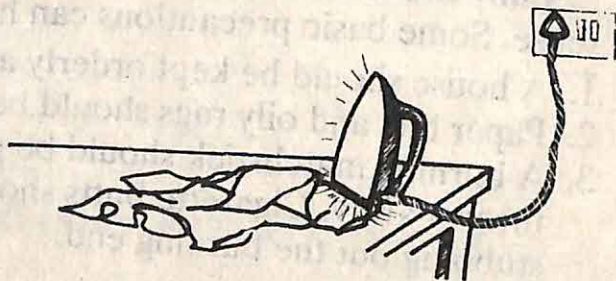
*Do not startle a person who is cooking.*





4. Children should not play with matches. They should not light crackers near doors and windows where curtains or other objects may catch fire.
5. If oil in a frying-pan catches fire, sand must be thrown into it to put out the fire. If water is poured in instead of sand, oil, being lighter than water, will float on it and flare up further. This is dangerous. The clothes and hair of the person working there can catch fire when the burning oil flares up. Sometimes even curtains nearby can catch fire.
6. If electrical wiring is not done properly, it can be the cause of a fire accident. It is wise to have the wiring checked periodically.

*Gas stoves should be maintained without leakage.*



*A hot iron can cause a fire.*

7. Gas and oil stoves in the kitchen must be maintained without any leakage.
8. Ashes removed from a firewood or coal oven should not be thrown directly into a dustbin. We must make sure that bits of live coal are put out before throwing them out.
9. A hot iron left on an iron-board, untended, may cause a fire. If the iron does not have an automatic heat control system, it should be switched off before it gets too hot. If charcoal is used, one must be careful and see that live charcoal does not fall out of it.
10. Clothes should not be dried close to a fire-place or chimney or near any open fire.



## **If there is a fire in your house**

If there is a fire in a house it will normally be the responsibility of the adults present to take the necessary action. This will include informing the nearest fire brigade or police station; evacuating people from the house and from adjoining houses; switching off electrical connections; saving valuables or other property if possible; closing doors and windows while leaving the house to cut off air supply so that the fire may not spread fast; helping to put out the fire by getting ladders, buckets and water; and making sure people do not crowd around the place.

Most of these tasks cannot be handled by children. But if you are in a house without an adult and there is a fire you can:

1. Get together other children who may be in the house and leave the house together.
2. Immediately inform the neighbours and ask for help.

## **First aid for fire accidents**

In case somebody faints due to fear or shock or even due to choking, he must be removed from the burning house immediately. This requires care on the part of the rescuer also and is best left to an adult.

1. Cover the mouth and nose with a wet cloth.
2. Turn the victim on his back and drag him out by the shirt collar or tie a rope round his shoulders and pull him out. While doing so, the rescuer must crawl forwards on all fours as the smoke will be thinnest at ground level.
3. The victim must be given artificial respiration immediately if breathing has stopped. (This should be done only by a trained person.)
4. When once breathing is restored, he can be treated for shock, burns and scalds.

## **To treat unconsciousness due to shock**

1. Lay the patient on his back with his head and shoulders low and



feet raised. This sends more blood to his brain. (Do not keep a pillow under his head.)

2. Allow fresh air to come in. (Avoid crowding round the patient.)
3. Loosen his clothes.
4. Sprinkle cold water on his forehead. This helps him to regain consciousness.
5. Give him a hot drink.

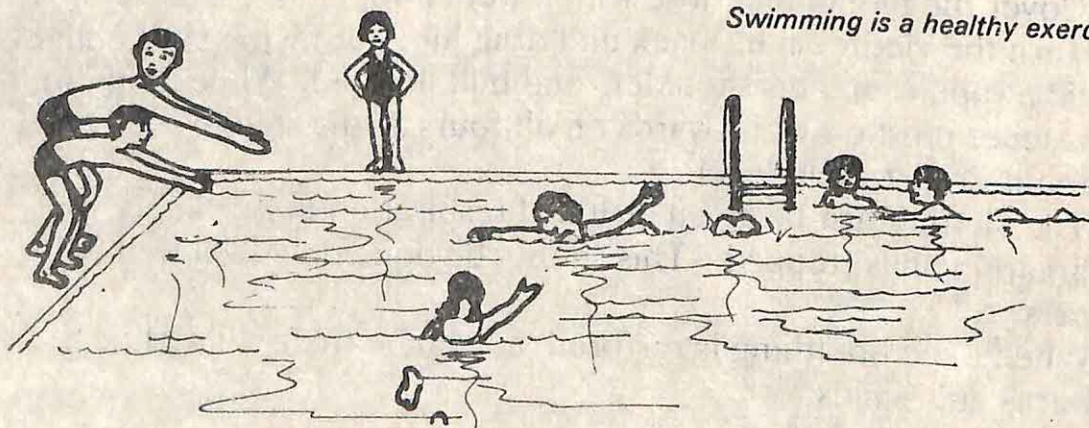
### **To treat burns and scalds**

1. For minor burns and scalds, apply vaseline or any ointment over the burnt area and bandage lightly with a clean bandage cloth. This keeps out dust.
2. If the burn is severe it is better to take him to a doctor.
3. In any case, patients suffering from shock or burns should be seen by a doctor, even if the injuries are mild and first aid has been given.

### **Swimming**

Swimming is a healthy exercise. It helps develop body muscles and improves respiration and blood circulation. Learning swimming under the supervision and guidance of a coach is very important.

*Swimming is a healthy exercise.*



1. Do not go to a swimming pool without an escort.
2. If you are a beginner, remain close to the side of the pool. Do not go to the deep end.



3. Learn the strokes properly.
4. Wear suitable swimming clothes.
5. Learn diving from a qualified coach.

### **Drowning**

A good swimmer can rescue a drowning person.

1. If you are on shore and fully clothed, undress quickly and swim towards him from behind.
2. Prevent him from catching hold of you, or else you might yourself get drowned.
3. Hold him by the back of the neck or the elbows and swim ashore.
4. Do not attempt a rescue if you are not a good swimmer, if the drowning person is bigger and heavier than you, or if there is a strong current. In any of these cases, get adult help as fast as you can.
5. Once out of the water, keep him in a slanting position, face downwards, pull his tongue out and allow him to breathe. Also loosen his clothes.
6. Give artificial respiration if needed, immediately.
7. Rub his limbs and proceed towards the chest muscles for proper blood circulation. (5 and 6 should be done only by a trained person.)
8. Give him a hot drink.
9. Call a doctor for further treatment.

### **Things to remember**

1. Carelessness is the main cause of fire accidents.
2. Children should not go near fire.
3. Lighting crackers during festival time should be done under the supervision of adults.
4. In case a fire accident occurs, we must be calm while taking the necessary action.
5. Suitable measures should be taken to prevent fire accidents.
6. The victim of a fire accident should be treated first for shock and then for burns and scalds.



7. Swimming should be learnt from a coach.
8. You should go swimming with an adult escort.
9. A drowning person must be rescued only by a trained person in the correct way.
10. He should be given artificial respiration.
11. Efforts should be made to maintain his blood circulation.
12. A doctor's advice and help must be sought.

### **Things to do**

1. Become a scout or guide. You will learn to be useful to yourself and to your community.
2. Learn swimming. This improves your health and stamina.
3. Practise safe methods in anything you do.

### **Exercises**

1. Why should you crawl when smoke surrounds you?
2. Why should you prevent a drowning person from catching hold of you?
3. If a person is unconscious, why should his head and shoulders be at a lower level than his legs?
4. Why should doors and windows be closed in case a house catches fire?
5. What kind of first aid would be suitable in case of mild burns and scalds?

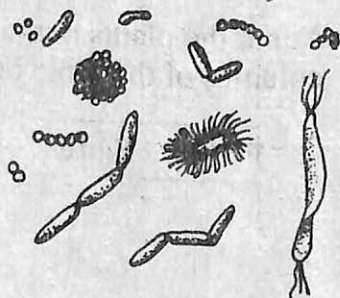
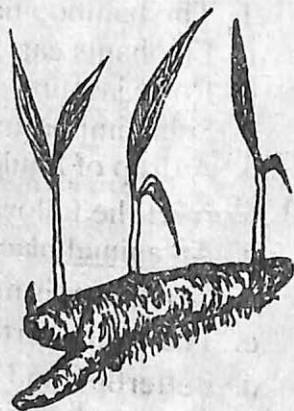
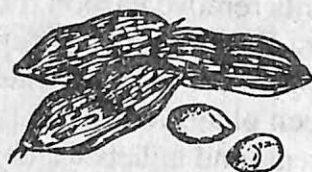
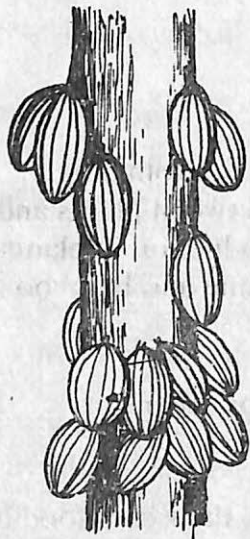


# Test papers

## Test Paper 1

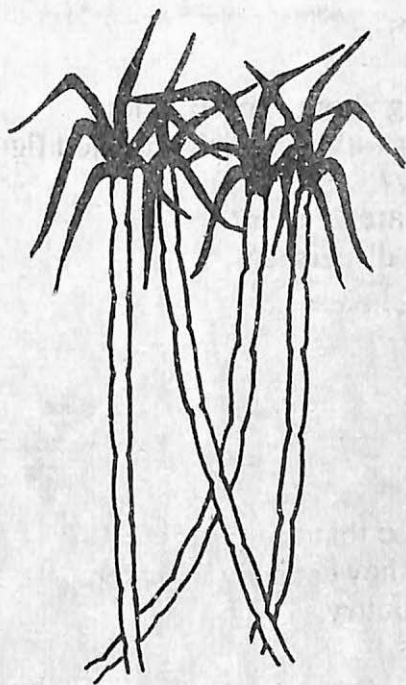
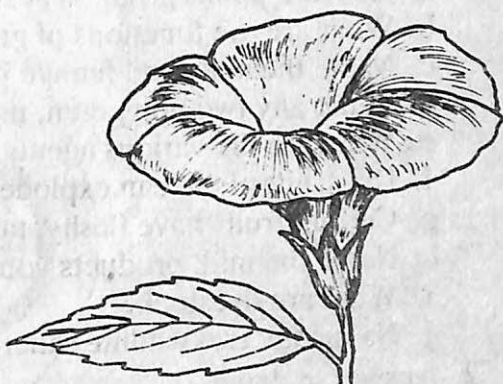
1. Answer in detail:
  - a. How will you differentiate a stone from a fly?
  - b. State the striking differences between plants and animals.
  - c. What do you know about reproduction in plants and animals?
  - d. How can you show that sugarcane and bamboo are only grasses?
  - e. How do plant fibres help us?
2. Complete the following:
  - a. Plants remove carbon dioxide by means of .....
  - b. Most flowering plants reproduce .....
  - c. Roots move towards water and .....
  - d. Green plants alone can prepare their own food because .....
  - e. Cereals and millets which form the staple food of man belong to .....
  - f. The bamboo has a .....
  - g. Elephants eat .....
  - h. Rose, jasmine and sandalwood are used in .....
  - i. Some important plants used in medicine are .....
  - j. A drop of liquid iodine added to starch .....
3. Correct the following statements changing only the words underlined.
  - a. An animal placed near a window-sill will grow towards it.
  - b. Movement is more obvious in plants than in animals.
  - c. The young turtles hatched from their eggs do not resemble their parents.
  - d. Butterflies and baboons undergo gradual changes in their development until they reach their adult forms.
  - e. Trees raised on mountain slopes bring about soil erosion.
4. Name the plants in the following illustrations and place them in the correct columns of the table below:

| Food | Fibre | Medicine | Spices | Furniture | Beverages | Oil |
|------|-------|----------|--------|-----------|-----------|-----|
|------|-------|----------|--------|-----------|-----------|-----|





5. Draw the missing parts for the following diagrams:

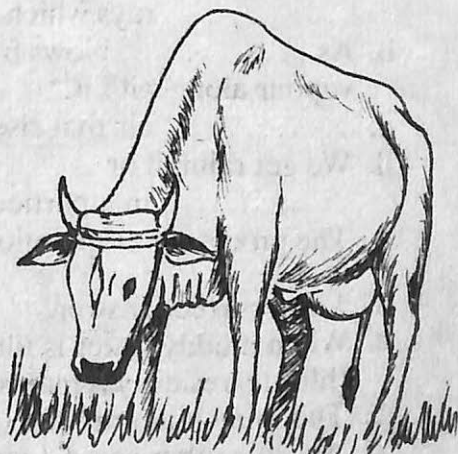
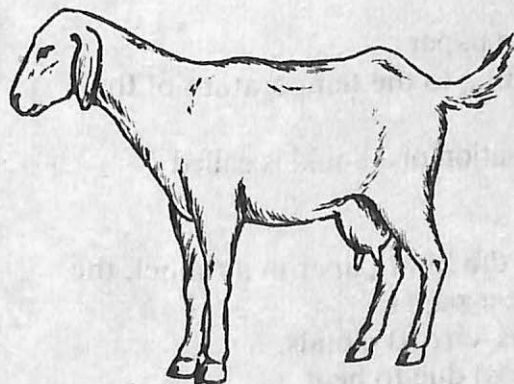
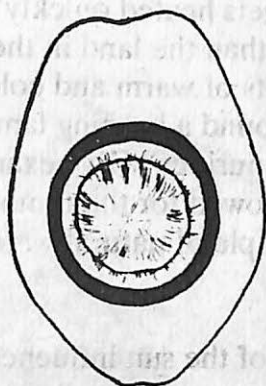
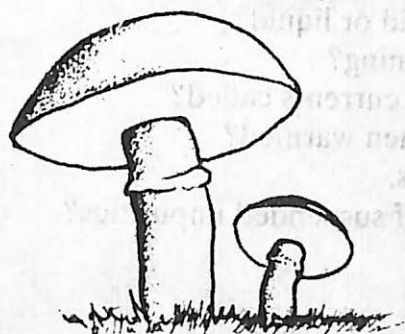


## Test Paper 2

1. Answer briefly:
  - a. How are plants grouped according to their reproductive habits?
  - b. What are the functions of green leaves?
  - c. Name the male and female parts of a flower.
  - d. Name any two non-green, non-flowering plants.
  - e. What are the various agents of dispersal of fruits and seeds?
  - f. Dry fruits alone can explode. Why?
  - g. Certain fruits have fleshy, tasty pulp. Why?
  - h. Name the milk products you know.
  - i. What are livestock?
  - j. Name any two wildlife sanctuaries you know.
2. Answer in detail:
  - a. Describe what stamens and pistil do to bring about reproduction.
  - b. Describe the body structure of a mushroom with a suitable labelled figure.
  - c. Where and how do mosses spread and grow?
  - d. What is leather? How is it obtained? What are its uses?
  - e. How do seeds and fruits of water plants get dispersed?
3. Find the odd one out, giving reasons for your choice.
  - a. ovary, pollen grain, ovule, stigma
  - b. balsam, fern, moss, mould
  - c. drumstick, cotton, milkweed, mango
  - d. bean, pea, coconut, castor
  - e. mutton, beef, pork, egg
4. Tick the statements that are true. Correct those that are false.
  - a. Lotus and lily produce heavy fruits so that they can sink in water.
  - b. Birds raised for meat and eggs are called poultry.
  - c. Bees collect nectar and pollen from flowers.
  - d. Rearing silkworms is called apiculture.
  - e. Plants do not disperse fruits and seeds.
  - f. After fertilisation, the ovary becomes a fruit.
  - g. Flowers attract bees and butterflies by having bright coloured petals and nectar.
  - h. Bacteria reproduce by simple cell division.
  - i. Stamens are the female parts of a flower.
  - j. Gooseberry is dispersed by animals.
5. Who am I?
  - a. I am hidden in a tiny box. I am yellow and powdery.
  - b. I am made of beeswax. I have six-sided chambers.
  - c. I am hidden in a fleshy fruit. My hard coat is not digested by crows.
  - d. I am a doctor. I treat sick animals.



- e. I have horns and hoofs. My horns are used for making combs.
5. Draw the missing parts for the following diagrams:



### Test Paper 3

#### 1. Answer briefly:

- Why are nights colder than the day time?
- Which factors determine the weather in a particular place?
- Which form of matter gets heated quickly? Solid or liquid?
- Why is the sea warmer than the land in the evening?
- What are the movements of warm and cold air currents called?
- What happens to air around a burning lamp when warmed?
- What are suspended impurities? Give examples.
- Which methods are followed for the removal of suspended impurities?
- Which is the purest sample of natural water?
- What is radiant heat?

#### 2. Answer in detail:

- Describe how the heat of the sun influences the weather in a particular place.
- How does weather influence living things?
- How can you show by a simple experiment that air expands due to heat?
- How do you know that warm air is lighter than cold air? Describe by means of an experiment.
- How are land breeze and sea breeze caused? Explain with suitable figures.
- How can dissolved impurities be removed from water?
- Which factors affect evaporation? Explain each of them suitably.
- What is precipitation? What are the various forms of precipitation? Explain how they take place.
- What are clouds made of? What are the various types of clouds?
- What is distilled water? How is it prepared? Describe with a suitable figure.

#### 3. Fill in the blanks:

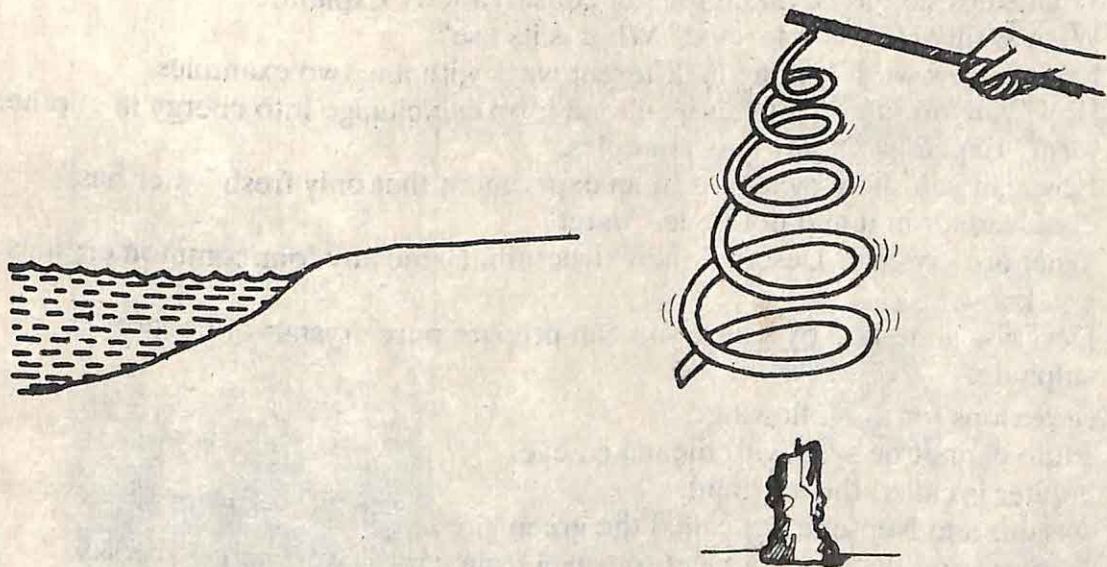
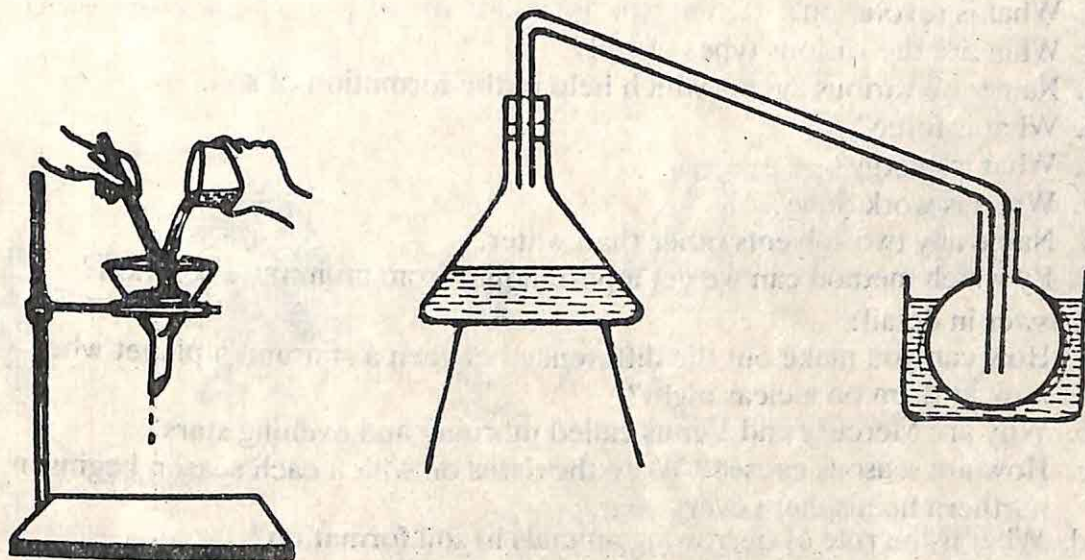
- The ..... gets heated more through radiation than by the ..... rays which pass through it during the day.
- As ..... blows from the sea to ....., it carries ..... vapour along with it.
- ..... air that rises up, turns the paper .....
- We get rainfall or ..... according to the temperature of the ..... in a particular region.
- The process of evaporation and condensation of a liquid is called .....

#### 4. Tick the correct answer.

- When muddy water is filtered through the filter paper in a funnel, the (filtrate/residue) remains within the filter paper.
- The rain clouds are the (stratus/nimbus/cirrus) clouds.
- Air, like other gases, (contracts/expands) due to heat.



- d. When a convection current takes place slowly, we get a (gentle breeze/  
strong wind).
- e. A polar bear prefers a (warm/cold) climate to live in.
5. Draw the missing parts for the following diagrams:





## Test Paper 4

### i. Answer briefly:

- Name the planets in the order of their nearness to the sun.
- Give one interesting fact about each planet including planet earth.
- What is gravity?
- What is rotation?
- What is revolution?
- What are the various types of soil?
- Name the various agents which help in the formation of soil.
- What is force?
- What is energy?
- When is work done?
- Name any two solvents other than water.
- By which method can we get a pure liquid from an impure solution?

### 2. Answer in detail:

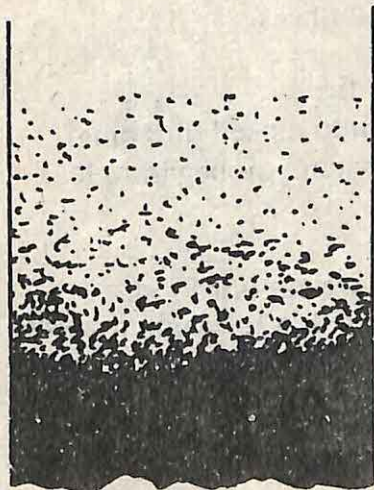
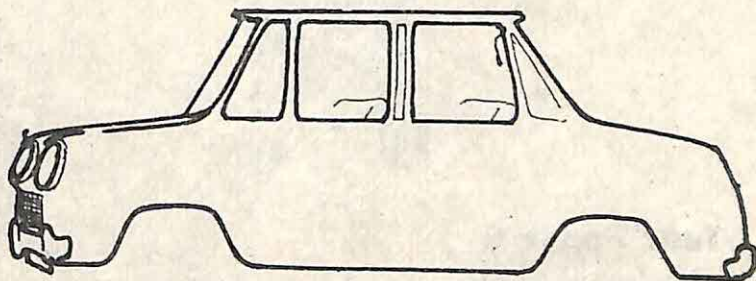
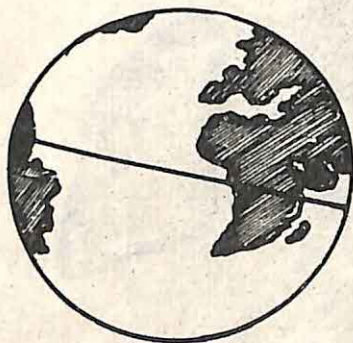
- How can you make out the difference between a star and a planet when you look at them on a clear night?
- Why are Mercury and Venus called morning and evening stars?
- How are seasons caused? Write the dates on which each season begins in the northern hemisphere every year.
- What is the role of burrowing animals in soil formation?
- How do glaciers help in the formation of soil?
- What steps should be taken for soil conservation? Explain.
- What is silt? How is it formed? What is its use?
- Explain how work is done in different ways with any two examples.
- How can you show that energy in one form can change into energy in another form? Explain with any two examples.
- How can you show by means of an experiment that only fresh water has dissolved air in it and not boiled water?
- What are crystals? Describe their structure. Name any four common crystals you know.
  - Describe a method by which you can prepare pure crystals of copper sulphate.

### 3. Give reasons for the following:

- Pluto cannot be seen with the naked eye.
- Jupiter is called the icy giant.
- Uranus and Neptune are called the green giants.
- The sun and the moon appear to travel from east to west across the sky.
- Earth pulls substances towards it.
- Loam is the best soil for the growth of plants.
- Gravel is unsuitable for the growth of plants.



- h. Clayey soil does not permit water to seep through it easily.
  - i. Energy present in one form changes into another form.
  - j. A magnet can be used to find a tiny needle which has been dropped on the ground.
  - k. A liquid can be poured from one container to another.
  - l. The volume of milk does not increase when sugar is added to it.
4. Draw the missing parts for the following diagrams:





5. Correct the following by changing the underlined words.

- a. Water dissolves nitrogen to form soda water.
- b. Carbon disulphide is used to prepare phosphorus crystals.
- c. The heat of the moon evaporates water from the sea.
- d. A windmill is used for grinding stones.
- e. Terrace cultivation is otherwise called mixed farming.
- f. Plant stems bind the soil together and prevent soil erosion.
- g. When people in the northern hemisphere experience spring, people in the southern hemisphere experience winter.

## Test Paper 5

1. Answer briefly:

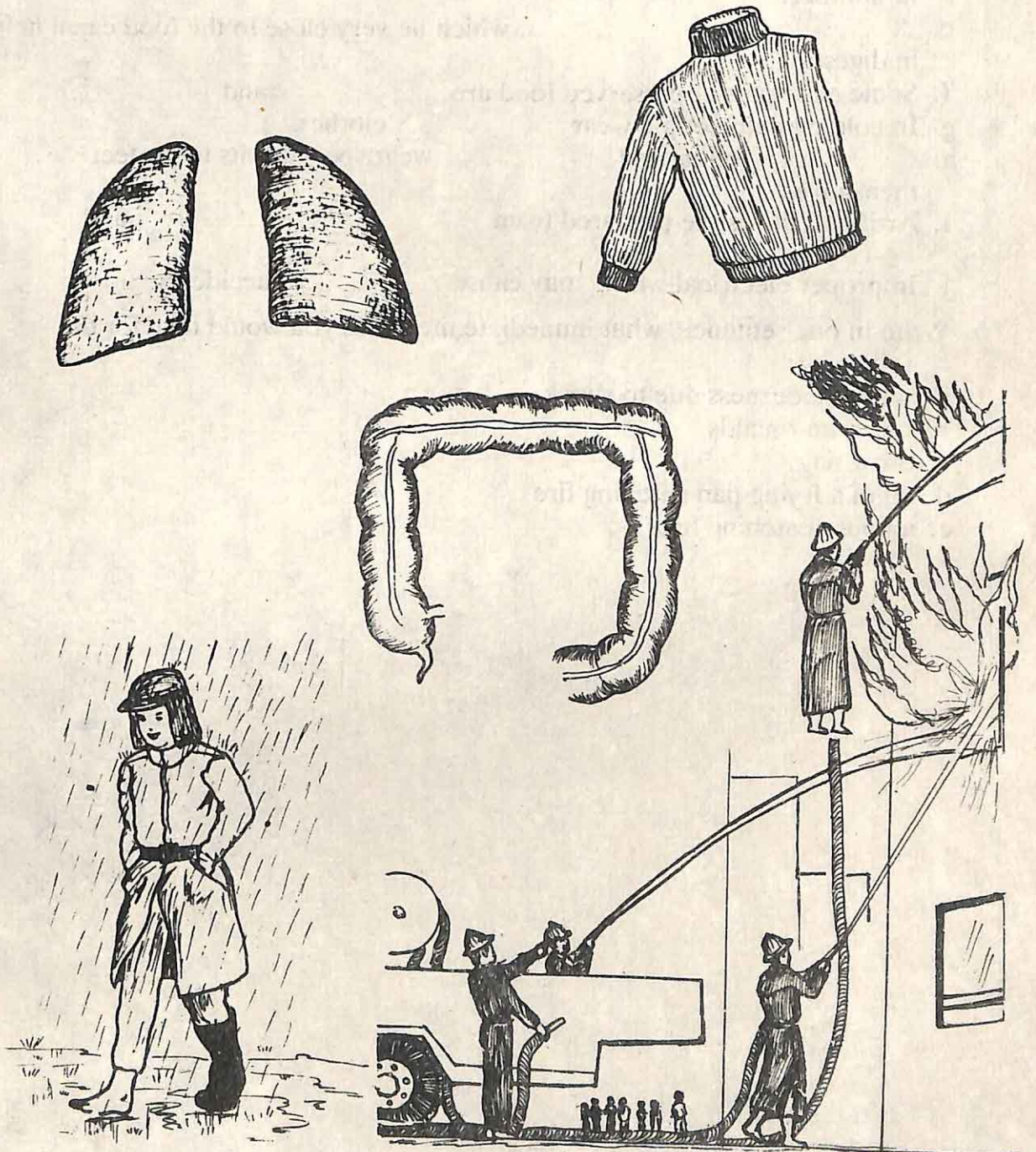
- a. Why are the organs of digestion necessary?
- b. Why do we take carbohydrates and fats?
- c. Why do children need protein in their daily diet?
- d. Why do we say that vitamins and minerals are protective foods?
- e. What is the function of the large intestine?
- f. How do you know that your lungs are elastic?
- g. How can you divide clothing into two kinds? What are they?
- h. Give two examples each for natural and artificial fibres.
- i. What is fibre glass? How is it made?
- j. What should be done in case your clothes catch fire?
- k. Why should paper bits and oily rags be thrown into closed dust bins?
- l. Write any two safety measures you would take when you began to learn swimming.

2. Answer in detail:

- a. Describe how each type of teeth helps us while we eat our food.
- b. Give a simple description of how food gets digested in the human body.
- c. Where are air sacs present? What work do they actually do?
- d. State the various healthy eating habits.
- e. How and why should we take care of our teeth?
- f. How does the diaphragm help in breathing in and breathing out air?
- g. Why should we breathe through the nose and not through the mouth?
- h. How are the lungs protected from damage?
- i. What clothing materials should we choose for the various seasons? Why?



- j. Write a short account of different kinds of wool.
- k. What are the advantages of using clothes made of artificial fibres? What are their disadvantages?
- l. How can you rescue a drowning person?
3. Draw the missing parts for the following diagrams:





- 4 Fill in the blanks:
- Games and ..... keep us fit and healthy.
  - ..... have a number of blood vessels around them.
  - ..... divides into two and leads to each lung.
  - The first set of teeth are called ..... teeth. They are ..... in number.
  - ..... and ..... which lie very close to the food canal help in digestion.
  - Some examples of preserved food are ..... and .....
  - In cold climate people wear ..... clothes.
  - ..... pilots and ..... wear special suits to protect themselves.
  - Artificial fibres are prepared from ....., ..... and .....
  - Improper electrical wiring may cause ..... accidents.
5. Write in one sentence, what immediate measures you would take for the following:
- unconsciousness due to shock
  - burns and scalds
  - drowning
  - oil in a frying-pan catching fire
  - a house catching fire